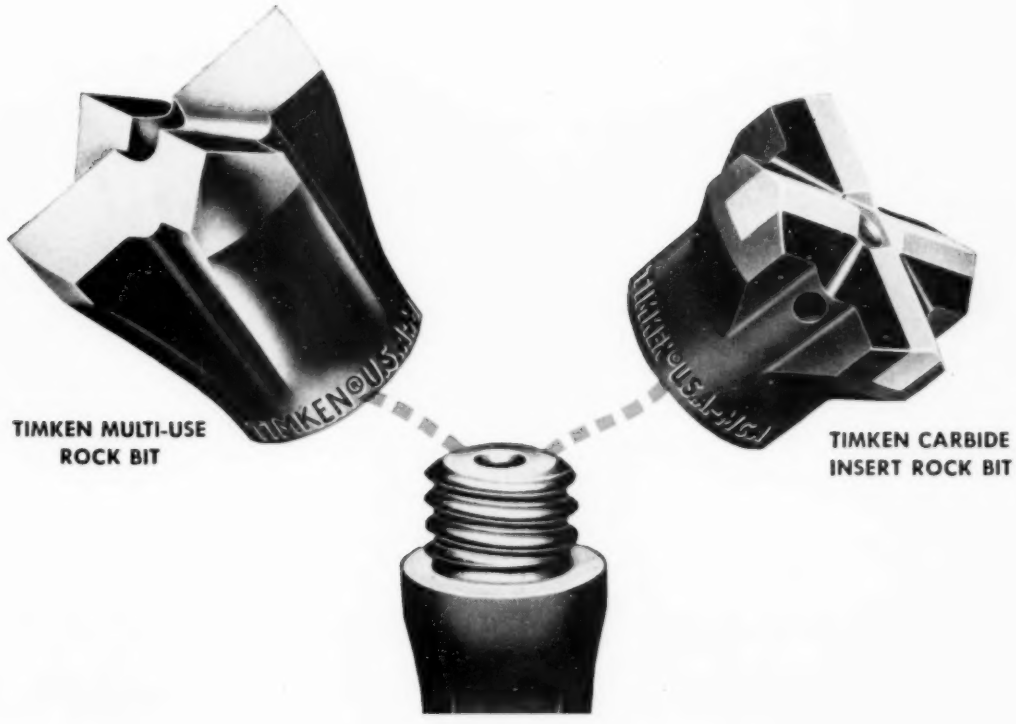
# ROADS AND STREETS

HIGHWAYS BRIDGES
AIRFIELDS
HEAVY CONSTRUCTION

FEBRUARY 1953






## Let one steel do the work of two with interchangeable TIMKEN® bits!

YOU don't need separate steels for each bit type when you use Timken® interchangeable rock bits. One steel does the work of two because both the Timken multi-use and carbide insert bits fit the same drill steel. With the two Timken bit types and only one steel, you can switch quickly to the most economical bit as the ground changes. And you can do it right on the job.

Use Timken multi-use bits for ordinary ground. With correct and controlled reconditioning, they'll give you the lowest cost per foot of hole when full increments of steel can be drilled.

For greatest economy when you hit hard or abrasive ground, switch to Timken carbide insert bits. They're your best bet for maximum speed drilling, constant-gage holes, small diameter blast holes and very deep holes.

Have both types of Timken bits on hand, and you'll have the answer to every one of your drilling problems.

Timken carbide insert bits and multi-use bits are interchangeable in each thread series. And they have these three important advantages: (1) made from electric furnace Timken fine alloy steel, (2) threads are not subject to drilling impact because of the special shoulder union developed by the Timken Company, (3) quickly and easily changed.

More than 20-years' experience of our Rock Bit Engineering Service is available to you in helping to select the best bits for your job. Write The Timken Roller Bearing Company, Canton 6, Ohio. Cable address: "TIMROSCO".

TIMKEN ... your best bet for the best bit ... for every job

# Here's a Big Advance in Bulldozing Performance

This bulldozing team introduces new dirt-moving ability; a new, narrower-width blade for transporting by highway; new ease of servicing and operation — all at a new low cost.

Here are some specific characteristics that make it such a productive combination for many dozing jobs:

**A great tractor.** This popular Allis-Chalmers HD-9 Tractor has power, weight and balance that put it in a class by itself.

**A revolutionary team.** Here is a tractor-dozer combination, designed as a unit, which compares in performance with conventional "dozers" weighing from five to six thousand pounds more.

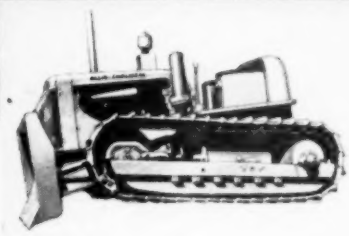
**No push-beams.** A completely new idea in bulldozer engineering, the Baker 9X blade is mounted directly to the HD-9 main frame. Tractor main frame and dozer are raised and lowered as a single unit.

**Lighter weight — better stability.** Almost 1,150 lb. lighter than standard dozer. Costs less to buy. And with lighter blade mounted 15 inches closer, tractor center of gravity is not upset. No excess wear on front truck wheels and support rollers.

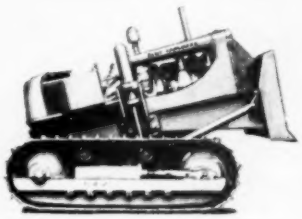
**Big dirt mover.** Because of extra clearance, greatly increased track oscillation and better balance, this team is a phenomenal performer in mud and tough going. And with blade fully six inches higher, capacity is kept on par with conventional blade.

**Simplified servicing.** 1,000-hour lubrication of truck wheels, idlers and support rollers. Dozer mounting does not interfere with engine accessibility. No removal of major tractor assemblies.

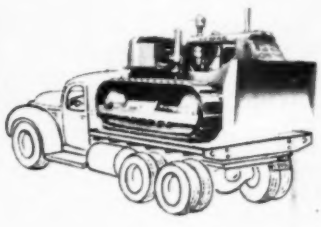
**Easy to operate.** Just by pulling a single lever, operator can shift from any of the six forward speeds to any of the three high-speed reverses. This, plus narrow, frame-mounted blade, makes the HD-9 particularly fast and maneuverable.



**BITES DOWN HARD.** Full 13-in. drop below ground, positive down pressure plus steep angle of penetration mean fast digging.



**HIGH LIFT.** Full 37 in. above ground. Excellent for pushing over trees and stumps and clearing brush.

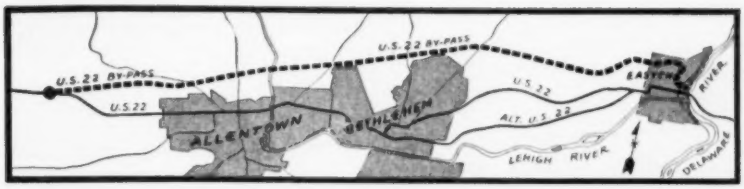


**EASIER HIGHWAY TRANSPORT.** Blade is only 8 ft. wide — no transport permit needed.

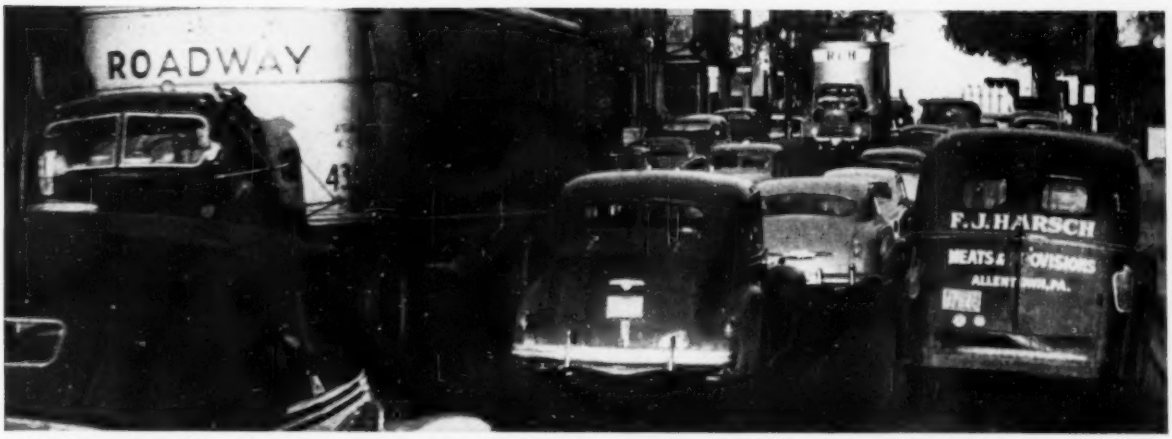
THE FINEST LINE ON EARTH

**ALLIS-CHALMERS**

TRACTOR DIVISION • MILWAUKEE 1, U. S. A.




# New by-pass to ease congestion in Lehigh Valley area




This bottleneck on Allentown's Tilghman Street is one of many along the present congested Route 22 that the new by-pass is intended to relieve.

*Below:* The western end of the new Route 22 by-pass, just outside of Allentown. The 4-lane highway will run north of Allentown and Bethlehem, and re-join old Route 22 at Easton. Completion is expected in late 1953 or mid 1954.

One of the critical traffic bottlenecks in Pennsylvania is in the heavily-populated Allentown-Bethlehem-Easton area of the Lehigh Valley. Here Route 22 winds through three industrial cities, and tourists and truckers battle traffic stymied by narrow bridges, stoplights and urban rush hour buses and automobiles.

A new 4-lane high-speed by-pass, 22.5 miles long and now under construction, will skirt this area to the north, substantially cutting the time needed to pass from the New Jersey state line to the highways leading west.

This $16,000,000 limited-access highway will have two 24-foot roadways with a 16-foot medial strip. Traffic interchanges will permit the free flow of traffic on and off the by-pass, and grade crossings will be eliminated by under- and overpasses. Bethlehem Steel is furnishing structural shapes, reinforcing steel, dowel units and guard rails.

With 52,000,000 registered vehicles on the road today, the work that state highway departments and roadbuilders are doing to relieve congested highways throughout the country is of tremendous importance. The Route 22 by-pass is one good example of how this work is going forward.

BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.

On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation. *Export Distributor:* Bethlehem Steel Export Corporation

## STEEL FOR HIGHWAYS

BETHLEHEM STEEL

**Dowel Units • Reinforcing Bars • Guard Rail**
**Guard Rail Posts • Wire Rope and Strand • Pipe**
**Hollow Drill Steel • Spikes • Bolts and Nuts • Tie-Rods**
**Timber Bridge Hardware • Sheet- and H-Piling**

# ROADS AND STREETS

FEBRUARY, 1953 • VOL. 96 • No. 2

**Roads and Streets represents 60 years of continuous publishing in the highway field; combined with Engineering & Contracting and Good Roads Magazines, established in 1892**

E. S. GILLETTE, President and Publisher

CCA NBP

HALBERT P. GILLETTE, Chairman of the Board and Editor-in-Chief

H. J. CONWAY, Assistant Publisher

A magazine devoted to the design, construction, maintenance and operation of highways, streets, bridges, bridge foundation and grade separations, and to the construction and maintenance of airports.


## Coming Articles

**Tunnel Methods at Gaviota Gorge**

How contractors tunneled shattered rock is described by project engineer on California project, where 4-lane-divided express roadway had to be carried through rugged country.

**58 Miles of Plant Mix in One Contract**

Longest resurfacing and widening job ever let in a single contract was handled by Carl E. Nelson out in Nevada this past fall and winter. "How it was done" story coming.

**Chrysler Building New Test Track Layout**

4.7-mile, 140-mph. test track for automotive development is being built by Chrysler Motors near Detroit. Some of the features to be described soon.

**Meeting Notes**

What happened at the AED, ARBA and other meetings—including Asphalt Paving Technologists (at Houston) and American Concrete Institute (at Boston).

**Also . . .**

10 Ways to Cut Scraper Cycle Time . . . How Oregon road modernization is based on economic analysis of justifiable cost . . . Maryland builds first pre-stressed concrete bridge . . . How a Detroit paving contractor checks gutter gradients to insure good drainage . . . Another grading methods report on the New York Thruway . . . More state-by-state summaries of 1952 highway progress and 1953 programs . . . Some cities have big street programs . . . Hardfacing and welding methods . . . How to start a Contractor Data File.

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**GILLETTE PUBLISHING COMPANY**

**PUBLICATION AND EDITORIAL OFFICES**

**22 WEST MAPLE STREET, CHICAGO 10, ILL.**

*Chicago Office*—S. A. Phillips, Sales Manager, 22 W. Maple St.
R. T. Wilson, Mid-West Manager
J. W. Gross, Western Manager
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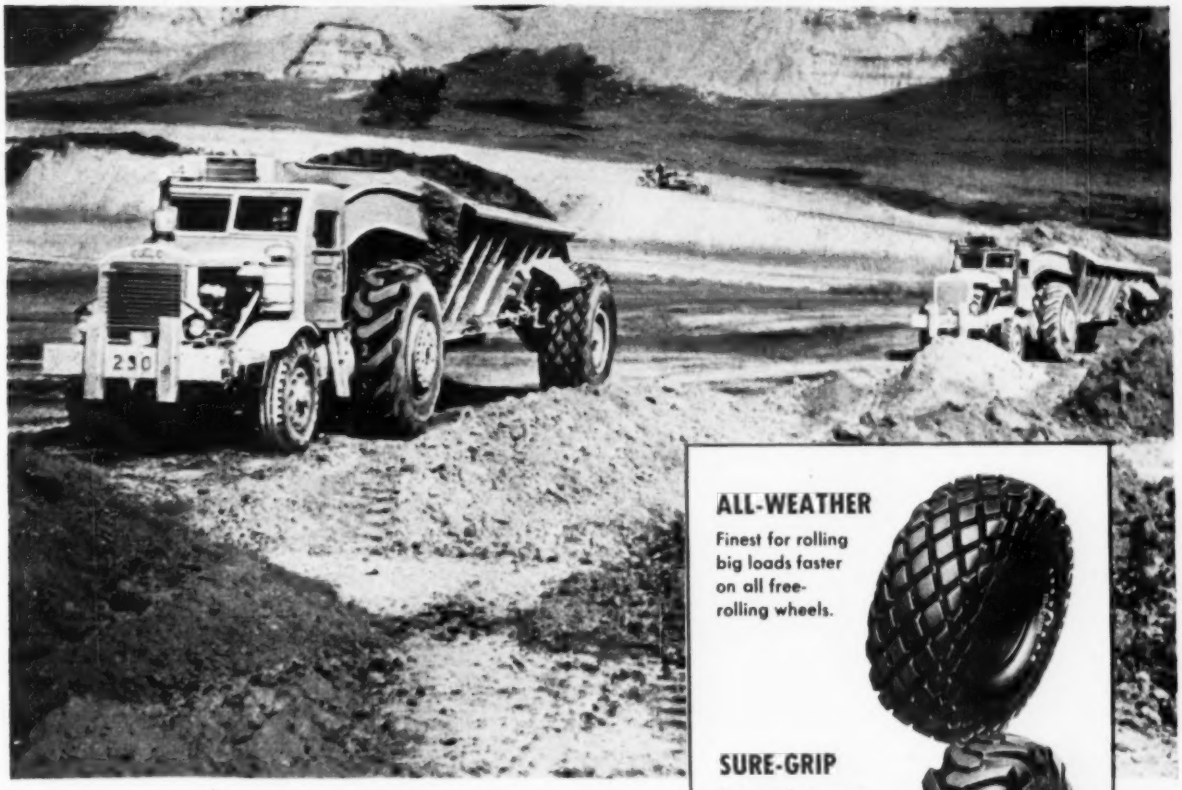
# Built to Keep Your Jobs on Schedule



THE right kind of tires play a big part in keeping jobs moving on time—on all kinds of ground, in all kinds of weather.

That's why Goodyear builds these three great tires for off-the-road service—to give you the right tires for every need.

You can depend on these proved tires because Goodyear has built 575 million tires—more tires for more purposes than any other tire manufacturer.

Doesn't it stand to reason that the *only* tire maker with such a great fund of practical experience can speed *your* jobs, cut *your* operating costs, as Goodyear has done for so many others? Goodyear, Truck Tire Department, Akron 16, Ohio.

**ALL-WEATHER**

Finest for rolling big loads faster on all free-rolling wheels.

**SURE-GRIP**

Top tire for traction on any rig where PULL is the prime need.

**HARD ROCK RIB**

Super-tough champ for front wheels on all tire-killing work.

All-Weather, Sure-Grip—
T.M.'s The Goodyear Tire & Rubber Company, Akron, Ohio

*FOR EACH JOB, THERE'S A COST-CUTTING GOODYEAR TIRE!*

# GOODYEAR

**MORE TONS ARE HAULED ON GOODYEAR TRUCK TIRES THAN ON ANY OTHER KIND**

*We think you'll like "THE GREATEST STORY EVER TOLD"—every Sunday—ABC Radio Network—THE GOODYEAR TELEVISION PLAYHOUSE—every other Sunday—NBC TV Network*

"I could see the corpsman kneeling over me. The blood plasma was running down through a tube into my arm and he said everything was going to be O.K. I was walking across an enemy mine field in Seoul when one exploded and a piece of shrapnel caught me in the leg.

" 'Got enough of that stuff?' I asked him, pointing to the blood. 'I guess we never have enough,' he said, 'but you can thank *somebody* for this pint.'

"How do you thank 'somebody' for blood? For saving your life? When I got back home, I discovered the answer at my local blood donor center. There's only *one* way to say thanks—by giving some of your own blood."

# "How do you thank 'somebody' for Blood?"

Yes, all kinds of people give blood—for all kinds of reasons. But whatever *your* reason for giving blood, this you can be sure of: Whether your blood goes to a combat area, a local hospital, or for Civil Defense needs—this priceless, painless gift will some day save an American life!

**Business Executives!**

**√Check These Questions!**

If you can answer "yes" to most of them, you—and your company—are doing a needed job for the National Blood Program.

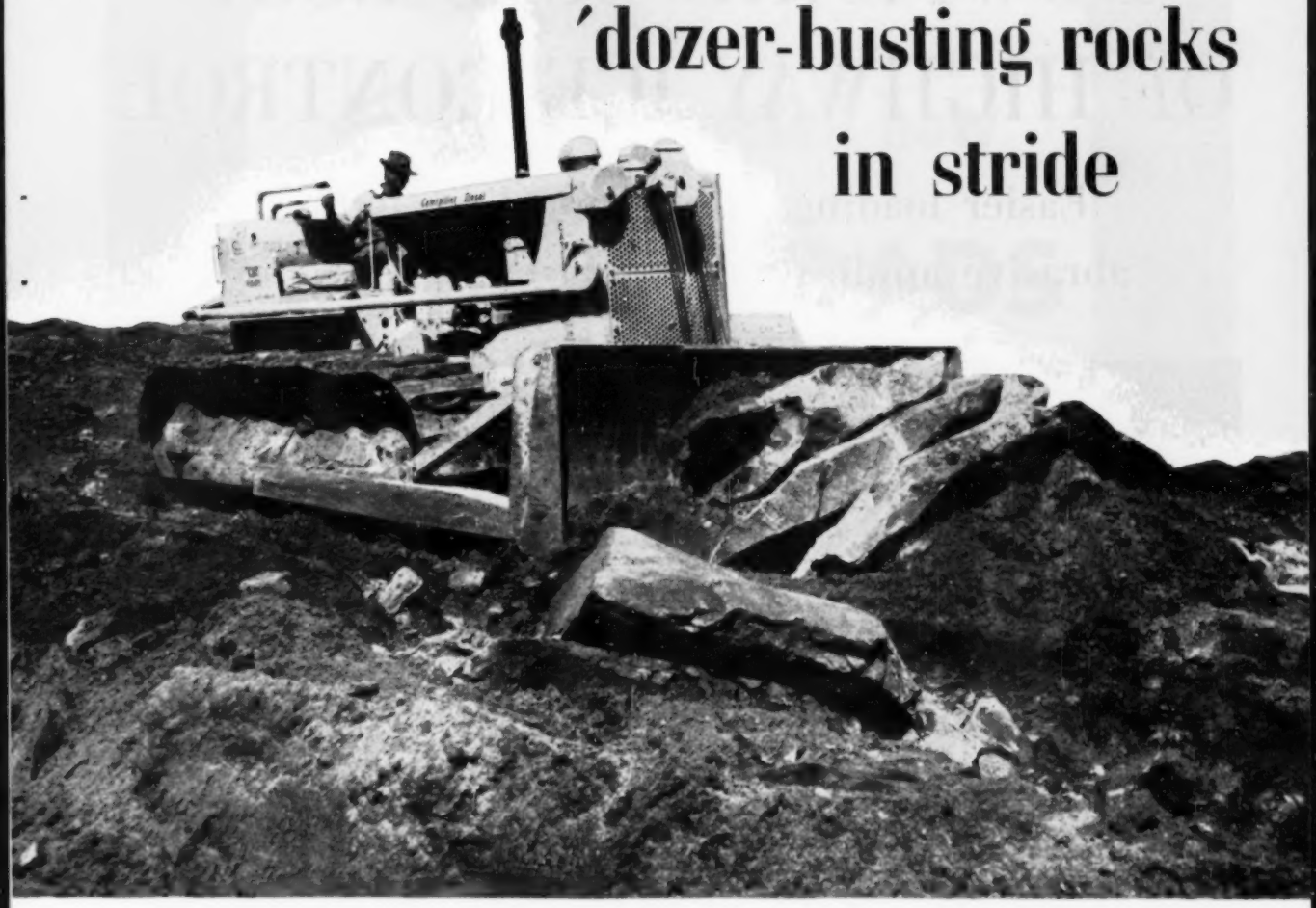
- ☐ Have you given your employees time off to make blood donations?
- ☐ Do you have a Blood Donor Honor Roll in your company?
- ☐ Have you set up a list of volunteers so that efficient plans can be made for scheduling donors?
- ☐ Have you arranged to have a Bloodmobile make regular visits?
- ☐ Has your management endorsed the local Blood Donor Program?
- ☐ Have you informed employees of your company's plan of co-operation?
- ☐ Was this information given through Plant Bulletin or House Magazine?
- ☐ Has your company given any recognition to donors?
- ☐ Have you conducted a Donor Pledge Campaign in your company?

Remember, as long as a *single* pint of blood may mean the difference between life and death for *any* American . . . the need for blood is *urgent!*

## Give Blood Now—Call Your Red Cross Today!

*National Blood Program*

# New Caterpillar 8SR takes 'dozer-busting rocks in stride



Caterpillar D8 Tractor with 8SR Bulldozer gets out heavy rocks on highway construction job near Hapeville, Ga. Owner is Hugh Steele Construction Co. of Atlanta.

If rocks or other hard-to-handle materials cause high maintenance costs on your regular 'dozers, the Caterpillar 8SR Bulldozer will pay for itself. On really tough construction jobs, the strength of this new, heavy-duty Cat 'Dozer comes into its own. The 8SR can dig in and break loose large rocks, broken concrete shale, and hard clay overburden where other bulldozers fail.

Cutting edge, moldboard and blade ends are heavily reinforced, high-strength steel to resist bending and abrasion. Push arms are extra-heavy. Adjustable braces vary blade pitch for best handling of different materials. Six-line cable, on a choice of front- or rear-mounted control, runs through hardened triple-sheave block for easier blade handling.

The 8SR Bulldozer is designed to team up with the Caterpillar D8 Tractor on your roughest jobs. The ruggedness and precision of Caterpillar manufacture give long work life and low down-time. A valuable "plus" is fast, on-the-job service from your well-stocked Caterpillar Dealer. He'll be glad to tell you more about this tough new Caterpillar 'Dozer. Give him a call today.

CATERPILLAR TRACTOR CO., PEORIA, ILLINOIS

**CATERPILLAR**

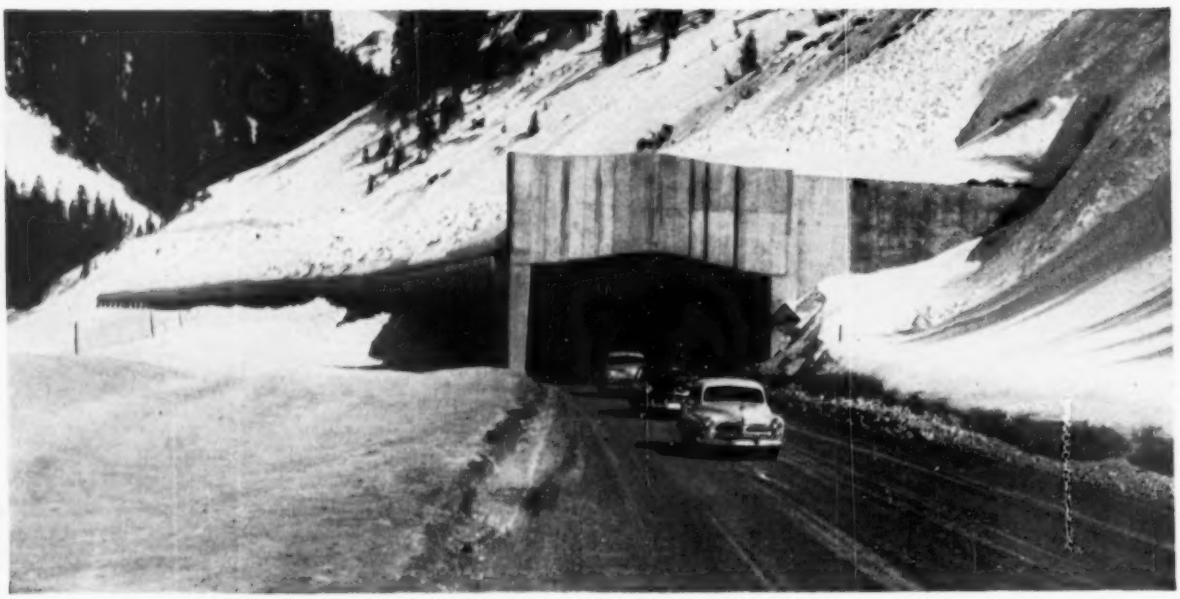
REG. U. S. PAT. OFF.

DIESEL ENGINES
TRACTORS • MOTOR GRADERS
EARTHMOVING EQUIPMENT

DOW

# DOWFLAKE CUTS COST OF HIGHWAY ICE CONTROL

## Easier loading, faster spreading, lighter abrasive applications save time and money



Experience through the years shows that the most economical and effective way to control ice on highways and secondary roads is with abrasives treated with Dowflake Calcium Chloride.

Take a look at what Dowflake will do for your highways, first from the standpoint of economy:

Dowflake keeps abrasive stockpiles freezeproof and free-flowing, *cutting loading labor costs.*

Dowflake treated abrasives bite right in—can't be swept away by wind and traffic. *One third less abrasive is needed.*

Dowflake makes the abrasive easier to handle—distribution time is greatly reduced. *Again, lower labor costs.*

Now, look at Dowflake from the standpoint of safer highways:

Because Dowflake makes the abrasive bite right in—*it goes to work immediately.*

Dowflake firmly anchors the abrasive—*protection lasts many times longer.*

Dowflake treated abrasives give double protection—*the abrasive provides traction while Dowflake melts the ice.*

Write us today for the complete story on how you can benefit with Dowflake ice control. THE DOW CHEMICAL COMPANY, Midland, Michigan.

*you can depend on* DOW CHEMICALS

DOW

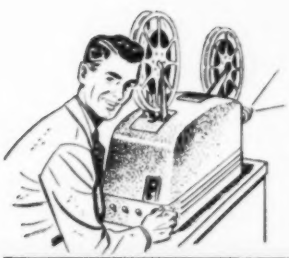
# Mr. Highway Engineer . . .

## *See* for yourself how

# RUBBER ROADS

## are stretching Highway Dollars!

**You've heard about rubber roads. . . . You've read about rubber roads. Now you can see for yourself the up-to-the-minute story of this newest development in paving.**



The Natural Rubber Bureau is offering for free showings its new motion picture "STRETCHING HIGHWAY DOLLARS WITH RUBBER ROADS." If you are a highway engineer, a public official, or are in any way concerned with building and maintaining roads, you won't want to miss the opportunity of seeing this movie. This 16 mm., 30-minute sound film shows actual test roads of natural rubber and asphalt in different parts of the country, it presents the opinions of the highway engineers who laid them, and it describes the work of the Natural Rubber Bureau Research Laboratory, at Rosslyn, Virginia. It is the most complete presentation of the rubber road story to date.

You can arrange to obtain this film by simply filling out the coupon below and mailing it to the

**WRITE FOR AN EARLY SHOWING OF THIS *NEW* FILM**

NATURAL RUBBER BUREAU
1631 K Street, N. W., Washington 6, D. C.

I would like to receive your film "STRETCHING HIGHWAY DOLLARS WITH RUBBER ROADS" for a free showing on.....(date).

Name.....

Title.....

Dept.....

Address.....

City.....State.....

**Natural Rubber Bureau**

1631 K STREET, N. W., WASHINGTON 6, D. C.

Natural Rubber Bureau Research Laboratory
Rosslyn, Virginia

# Excuse us for not telling

**Auxiliary attachments, available any time, make Tournatractor year 'round money-maker**

**BULLDOZER, ANGLEDOZER** For dozing work, Tournatractor can be equipped any time with A-frame and electric-control 2½-yd. Bulldozer, 3-yd. Angledozer, or 11'4" x 54" Root Rake.

**PUSHER PLATE, PCU** With all-steel pusher plate attached to standard bumper bar, Tournatractor push-loads scrapers. Double-drum electric PCU available for operating towed equipment.

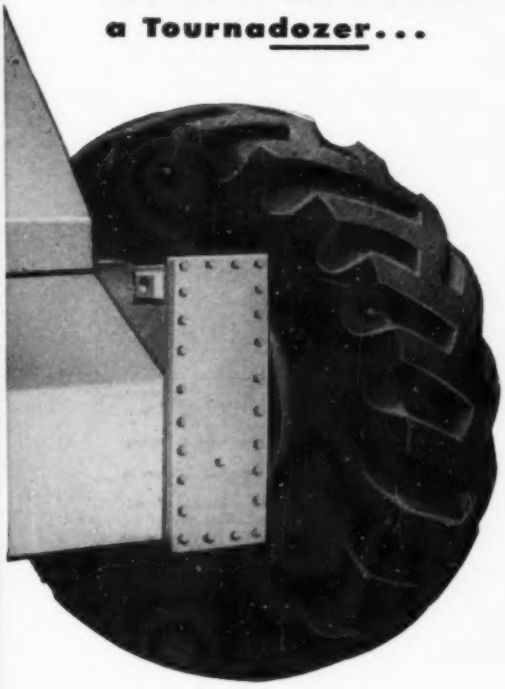
NOTE: Down-pressure attachment, blade tilt mechanism, 14-ton side-boom crane, torque converter, cab, lights also available.

LETOURNEAU EQUIPMENT

**FOR 24 YEARS THE LEADER IN RUBBER-TIRED**

# you!

**for 6 years, we've been calling our 186 hp, 19 mph rubber-tired tractor a Tournadozer...**



**. . . this name may have suggested application to dozer work only.**

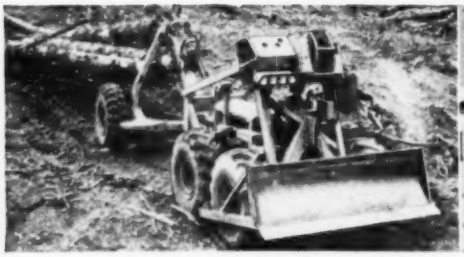
We should have told you otherwise. Actually, over the years, this unit has proved to be much more than a dozer. It's an all-purpose tool — just as effective as a pull-tractor, or a push-tractor, or a haul-tractor as it is a dozing-tractor. Its high speeds and fast maneuvering are of even greater advantage on hauling and pushing than on dozing where output requirements and range of operations are limited.

To clarify its many applications, we are re-naming the unit "Tournatractor". We are also revising our price lists to show our price for the tractor unit without the A-frame, blade, and blade controls, so that it will be directly comparable to crawler-tractor prices. On this basis, you will find you can buy a 4-wheel, high-speed, rubber-tired Tournatractor, FOB Longview, Texas, for only $18,840 (with 18.00 x 25 tires). You then can add the matched attachments you want.

This price structure is similar to that charged for any big, heavy-duty crawler-tractor, but look at the money-making advantages you get with Tournatractor:

1. **Power . . . 186 hp.**
2. **Anti-friction power flow, engine to treads.**
3. **Speeds forward — to 19 mph.**
4. **Speeds reverse — to 8 mph.**
5. **Instant speed change . . . constant-mesh transmission.**
6. **Go-anywhere, 4-wheel-drive on rubber . . . wider range of work and profit opportunity . . . no planking curbs, no trailer haul.**
7. **Electric fingertip control steer and shift . . . easier, faster maneuvering.**
8. **Giant safety air brakes . . . 2822 sq. in. on 4 wheels.**
9. **Low maintenance . . . elimination of some 500 crawler-track assembly parts that grind and wear in dirt on crawling tractors.**
10. **Easier operation, less fatigue, easier to get good operators.**

Investigate this rubber-tired tractor . . . it will do 85% of your tractor jobs *twice* as fast as a crawler. Ask your LeTourneau Distributor to arrange a demonstration and prove it on your job. Make your own comparison of production. You'll find the profits with Tournatractor too big to miss. Write or phone today.



**67,000-LB. WINCH** For skidding logs, pulling mired trucks, etc. Operates at 56 or 113 ft./min., in or out, while rig is in motion or stationary. Can pull from any angle up to 90°.

**SNOW PLOW** V-type. Mounts on same A-frame as Bulldozer or Angledozer. Has 12'4" clearing width, 6½' clearing height. 9' electric-control Snow Wing available as optional equipment.

**FOR SCRAPER OPERATION** Double electric PCU operates any cable-controlled scraper. For LeTourneau electric scraper, optional electric jack can replace PCU. Just "plug in" and go to work.

Tournatractor—Trademark Tournadozer, Angledozer—Trademark Reg. U. S. Pat. Off. T-313-G

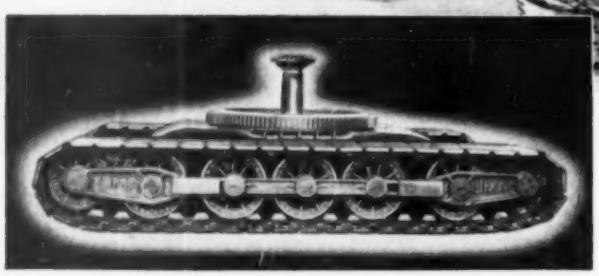
**DIRTMOVING**

**R. G. LeTOURNEAU, INC.**

*Peoria, Illinois*

# LIMA

SHOVELS • CRANES
DRAGLINES • PULL-SHOVELS



***LIMA SHOVELS*** are available in capacities from ¾ to 6 yards.
***LIMA CRANES*** are available in sizes to 110 tons capacity.
***LIMA DRAGLINES*** are available in variable capacities to suit specific needs.
Wheel or truck mounting is available on machines of ¾ and 1½ yards capacity.

## The Right Footing to Get There when the Going's Tough

When the snow is soft and deep, the smart sportsman doesn't bog down trying to buck it. He straps on his snow shoes—and the increased bearing area lets him go up and over the drifts.

It makes equally good sense to buy a shovel, crane or dragline that's built to ride over *not through* the soft spots—a LIMA, of course.

The crawlers on a LIMA are long and wide to give ample stability. Slightly elevated at the front to give a sled runner effect—self-cleaning—the LIMA crawler takes the tough spots right in stride.

So, when you're looking for equipment with greater working range—that will operate in the bad spots as well as the good ones—call your nearest LIMA Sales Office or Distributor. You'll find there are many other features—air actuated clutches, wide drums, anti-friction bearings throughout, etc.—that will help you set new performance records.

LIMA
SHOVELS • CRANES
DRAGLINES • PULLSHOVELS

BALDWIN BLH LIMA-HAMILTON
Construction Equipment Division

BALDWIN-LIMA-HAMILTON CORPORATION
Construction Equipment Division
LIMA, OHIO, U.S.A.

for glarefree concrete
roads,
sidewalks, walkways

# AE DISPERSED BLACK

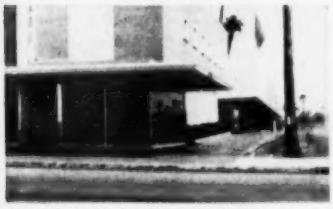
in monolithic
or topping concrete

Horn AE Dispersed Black is used in air entrained or ordinary concrete for darkening surfaces of concrete highways, center islands, sidewalks, walkways and concrete floors. Such surfaces absorb heat and reduce ice build up and driving hazards and improve visibility. Darkened store sidewalks reduce window glare and increase the visibility of store displays and merchandise. AE Dispersed Black does not in any way counteract the beneficial effects of an air-entraining agent. Used by Government, State and Municipal Highway Departments. Send for full information today.

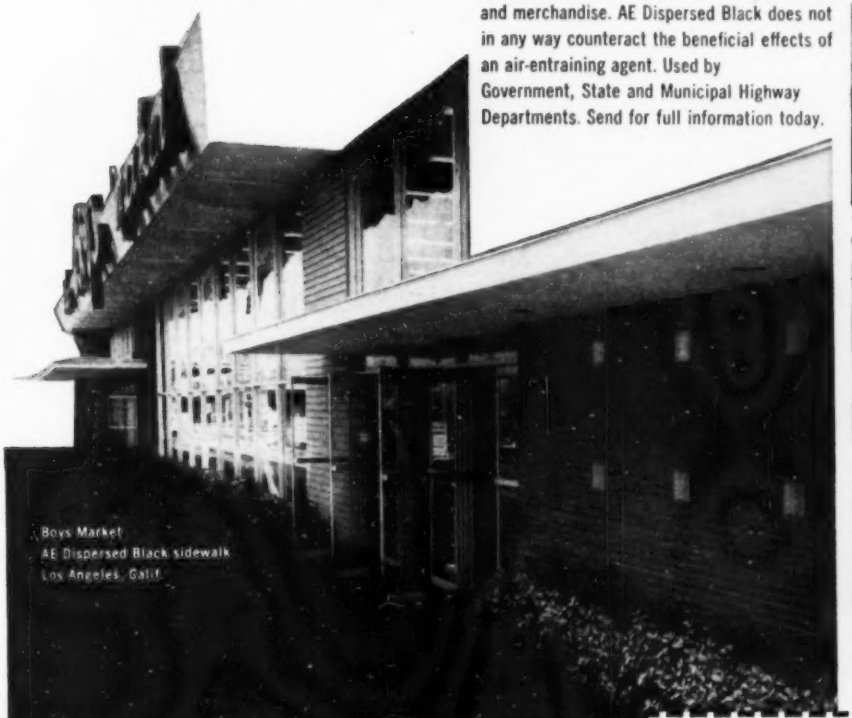
Centennial Bldg., Corning Glass Works, N. Y.

Goldblatt's Department Store, Chicago, Illinois

Boys Market, dark grey interior store floor



Sears, Roebuck, San Diego, California



Boys Market
AE Dispersed Black sidewalk
Los Angeles, Calif.

A. C. HORN Co., Inc. est. 1897

Manufacturers of materials for building maintenance and construction
LONG ISLAND CITY 1, N. Y. • Los Angeles · San Francisco · Houston
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A. C. HORN COMPANY, INC.
Long Island City 1, N. Y.

R553

Please send me ☐ complete data on AE DISPERSED BLACK

HORN

☐ free copy of your 106-page Construction Data Handbook

NAME _____ TITLE _____

FIRM NAME _____

ADDRESS _____

CITY _____ STATE _____

SPREAD HARSH DRY CONCRETE FAST

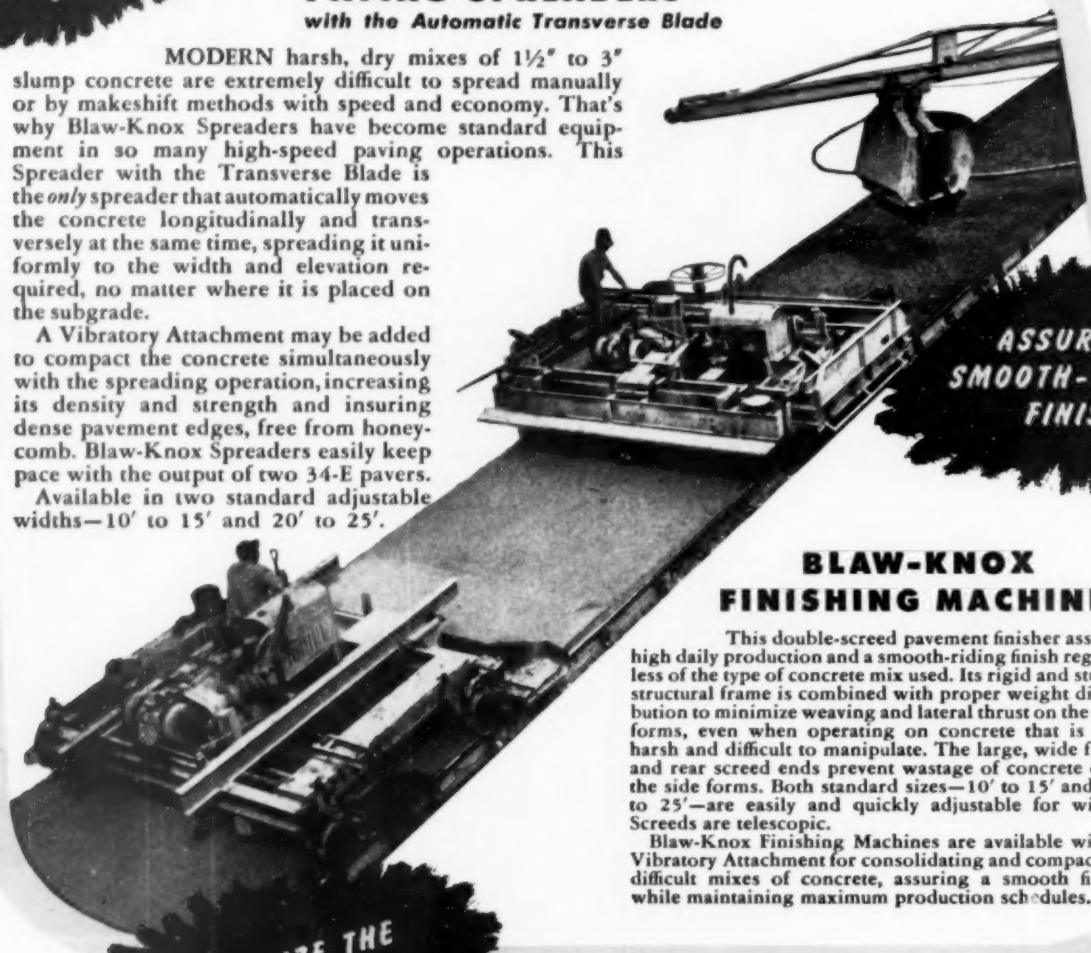
## BLAW-KNOX CONCRETE PAVING SPREADERS

***with the Automatic Transverse Blade***

MODERN harsh, dry mixes of 1½" to 3" slump concrete are extremely difficult to spread manually or by makeshift methods with speed and economy. That's why Blaw-Knox Spreaders have become standard equipment in so many high-speed paving operations. This Spreader with the Transverse Blade is the *only* spreader that automatically moves the concrete longitudinally and transversely at the same time, spreading it uniformly to the width and elevation required, no matter where it is placed on the subgrade.

A Vibratory Attachment may be added to compact the concrete simultaneously with the spreading operation, increasing its density and strength and insuring dense pavement edges, free from honeycomb. Blaw-Knox Spreaders easily keep pace with the output of two 34-E pavers.

Available in two standard adjustable widths—10′ to 15′ and 20′ to 25′.



ASSURE A SMOOTH-RIDING FINISH

## BLAW-KNOX FINISHING MACHINES

This double-screed pavement finisher assures high daily production and a smooth-riding finish regardless of the type of concrete mix used. Its rigid and sturdy structural frame is combined with proper weight distribution to minimize weaving and lateral thrust on the side forms, even when operating on concrete that is dry, harsh and difficult to manipulate. The large, wide front and rear screed ends prevent wastage of concrete over the side forms. Both standard sizes—10′ to 15′ and 20′ to 25′—are easily and quickly adjustable for width. Screeds are telescopic.

Blaw-Knox Finishing Machines are available with a Vibratory Attachment for consolidating and compacting difficult mixes of concrete, assuring a smooth finish while maintaining maximum production schedules.

MECHANIZE THE ENTIRE JOB FOR...

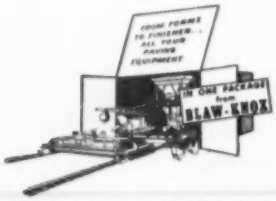
## HIGH-SPEED, LOW-COST CONCRETE PAVING CONSTRUCTION

Mechanization is the key to greater efficiency and economy in modern concrete paving operations. And the key that opens the door to greater profit on *your* job is 100% mechanization with the Blaw-Knox "Complete Package" of concrete construction equipment, developed to bring unified, balanced, "assembly-line" methods to road building operations. The Blaw-Knox "Complete Package" of cost-cutting equipment contains every piece of equipment you need, from forms to finisher, to give you the step-by-step mechanization that assures high-speed, low-cost concrete paving construction.

Blaw-Knox is your *only* source for a completely mechanized outfit . . . a one-responsibility "package" available on one order, in one shipment and with only one financial arrangement. One responsible distributor organization simplifies maintenance and supply of genuine factory replacement parts. One Blaw-Knox trained man can service *all* your "package" equipment. Start mechanizing your paving outfit today to get your share of the big jobs. See your nearest Blaw-Knox distributor for complete details.

**USE THE BLAW-KNOX *"Complete Package"* of concrete paving equipment**

It includes: Clamshell Buckets • Aggregate and Cement Batching Plants • Steel Road Forms • MultiFoote Concrete Pavers • Precision Subgraders • Concrete Paving Spreaders • Finishing Machines




BLAW-KNOX

**BLAW-KNOX EQUIPMENT DIVISION**

**Blaw-Knox Company**

Farmers Bank Bldg. • Pittsburgh 22, Pa.

NEW YORK • CHICAGO • PHILADELPHIA • BIRMINGHAM • WASHINGTON • SAN FRANCISCO

# Machine with a reach!

## THE MULTI-PURPOSE GRADALL

HERE'S a particularly good example of a tough excavation made easy by the Gradall. On this job, hard-to-get-at clay had to be removed from beneath a roadbed to build a pedestrian underpass. Gradall's telescoping, *arm action* boom reached far in—often horizontally—digging close to piling, completing the job *fast* and with such precision that hand labor was practically eliminated.

You've undoubtedly encountered a number of such tough jobs you could have completed faster and better with a Gradall. And if you ask any Gradall owner, he'll tell you that he keeps his Gradall *busy*—handling a wide variety of jobs such as trenching, backfilling, ditch cleaning, grading, and pavement removal. And from one job, it's ready to speed to the next, carrying its own interchangeable attachments for the work to be done.

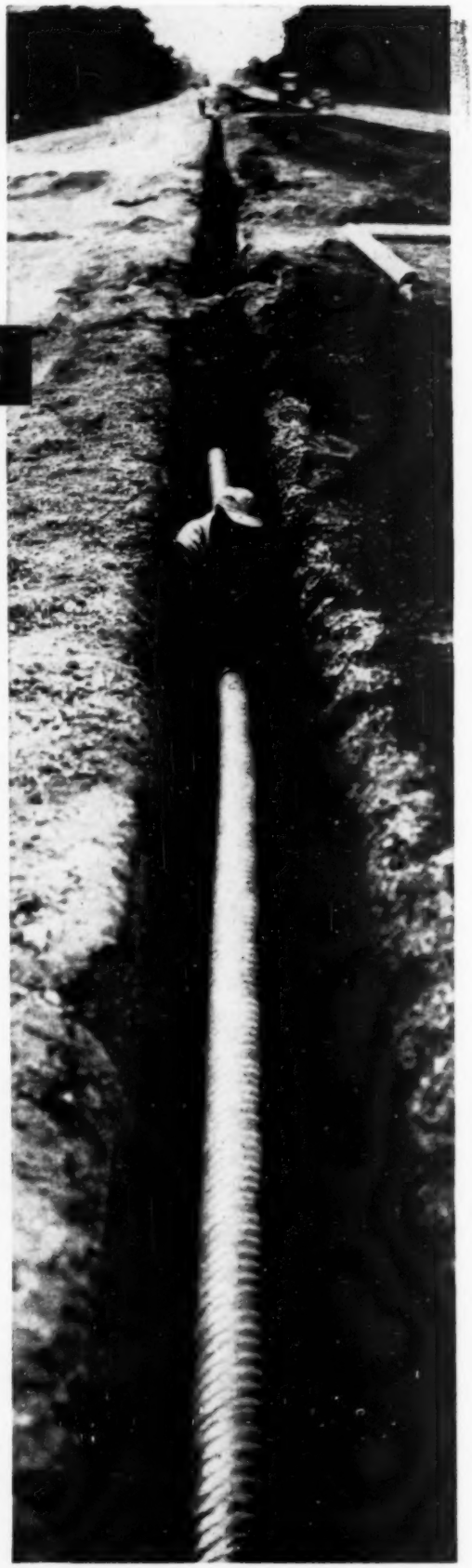
But see the Gradall in action—see how this multi-purpose machine can cut costs and build profits for you. Your nearest Gradall Distributor will be glad to arrange a field demonstration.

**Gradall**
DIVISION OF WARNER & SWASEY Cleveland
PRECISION MACHINERY SINCE 1880

**Gradall Distributors in over 75 principal cities in the United States and Canada**

YOU CAN PRODUCE IT BETTER, FASTER, FOR LESS WITH WARNER & SWASEY MACHINE TOOLS, TEXTILE MACHINERY, CONSTRUCTION MACHINERY

# Underground water won't flex its "MUSCLES" HERE

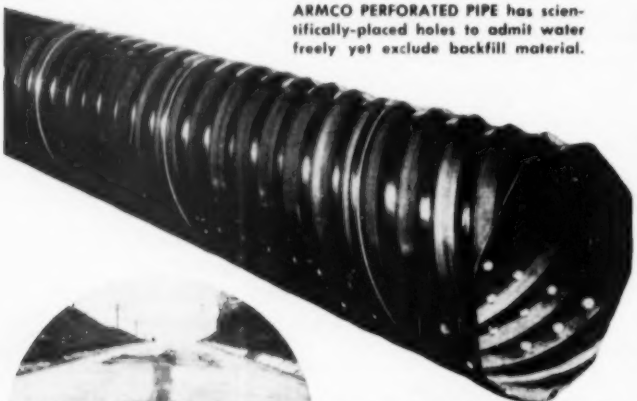


Underground water often refuses to hibernate in the winter. Instead, it keeps expanding and contracting its "muscles" during freezing and thawing periods. Result—expensive pavements need repair every spring.

Armco Perforated Pipe is the logical answer to most of your subdrainage problems. It does two things—it drains the water out and keeps it out. Continuing high maintenance cost is eliminated.

Lightweight Armco Pipe is easy to haul and handle. Long sections, 20-feet or more, mean fewer joints—less assembly time. And strong, positive joints are assured by simple band couplers that guard against disjointing.

With sturdy Armco Perforated Pipe there is no danger of crushing, cracking or disjointing under heavy loads. Even shifting soils and severe frost action have no effect. Use Armco Pipe under highways and streets or wherever else excess ground water is troublesome. Write for more data. Armco Drainage & Metal Products, Inc., 1583 Curtis Street, Middletown, Ohio. Subsidiary of Armco Steel Corporation. Export: The Armco International Corporation.



**ARMCO PERFORATED PIPE** has scientifically-placed holes to admit water freely yet exclude backfill material.

**WATER PLAYED HAVOC** in the subgrade of this highway. Extensive repairs are needed.

**ARMCO PERFORATED PIPE**

ARMCO

ROADS
STREETS
HIGHWAYS
AIRPORTS

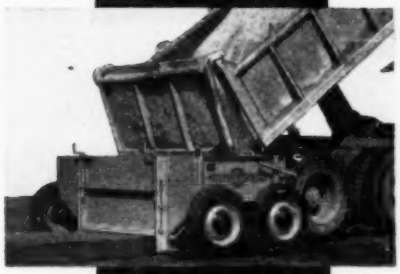
# *You Name Your Stabilization Job...*

LANDING STRIPS
PARKING AREAS
ACCESS ROADS
SHOULDERS
SUB-BASES
DETOURS

*and we will show you how a*

# WOOD Roadmixer

*will do it faster, better and for less money than any other method or equipment you have ever used for surface courses or base stabilization*



**WOOD Spreader Box**
Attached in 30 seconds to a dump truck, the Wood Spreader Box measures and forms materials into accurately proportioned windrows as the truck moves along. Windrow capacities of 2 to 8 cu. ft. are quickly and easily controlled by adjustable tailgate. The Wood Spreader Box eliminates guesswork in measuring-imported materials placed on sub-grades or bases.

Illustrated above is a Model 42 Wood Roadmixer mixing soil-cement base course for a superhighway with production of 250 tons per hour.

It eliminates the central plant — it mixes native or imported materials — it handles emulsion, road oil, soil-cement or other chemical mixes at less cost per square yard or per ton than any other **single** piece of equipment on the market.

For facts, see any Wood distributor or write us direct for literature and prices on Wood Roadmixers, Preparizers, Windrow Proportioners, Spreader Boxes and Tank Trailers.

ROADBUILDING EQUIPMENT

**WOOD MANUFACTURING CO.**

**Box 620**
**6900 Tujunga Avenue**
**North Hollywood, Calif.**

**Export Offices: 3938 Wilshire Blvd., Los Angeles 5, California · Cable Address: Woodor**

# 1,000,000

## INDUSTRIAL ENGINES

## *built in ONE year*

*It's a new world production record — never before accomplished.* For 33 years BRIGGS & STRATTON has been establishing a long list of firsts. And now, in 1952, another is added.

BRIGGS & STRATTON is recognized as the pioneer and the leader in its field . . . setting new standards, year after year in engineering, in design, in engine performance and in precision mass production.

Whether you are a manufacturer, dealer or user of gasoline engine powered equipment — you are assured of top performance when you specify BRIGGS & STRATTON 4-cycle, single cylinder, air-cooled engines. They are the "preferred power" value all over the world.

BRIGGS & STRATTON CORPORATION
Milwaukee 1, Wisconsin, U.S.A.

4 CYCLE
**BRIGGS & STRATTON**
GASOLINE ENGINES

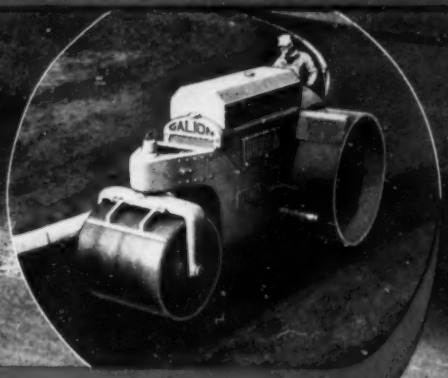
BRIGGS & STRATTON 4-cycle, single cylinder, air-cooled engines are available from ¾ to 8¼ hp. — in many models and types. They are preferred power for hundreds of types of machines, tools and appliances. All are backed by a world-wide service organization, factory supervised, unequalled in the industry.

*In the automotive field, too, Briggs & Stratton is the recognized leader — and the world's largest producer of locks, keys, and related equipment.*

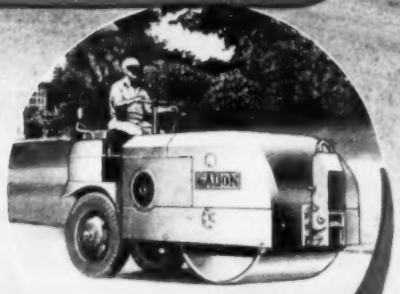
# GALION *
## SELLS THE MOST - GIVES THE MOST

* THE WORLD'S LARGEST MANUFACTURER OF ROLLERS

**TANDEM ROLLERS – *Variable Weight***



**THREE-WHEEL ROLLERS**



**PORTABLE ROLLER**

**TRENCH ROLLER**

## THERE'S A GALION FOR EVERY NEED

**TANDEM ROLLERS**
Variable Weight
For finish rolling.
3-5 Ton 8-12 Ton
5-8 Ton 10-14 Ton

**THREE-WHEEL ROLLERS**
For primary compaction and finish rolling.
"Warrior" – 6, 7 and 8 Tons
"Chief" – 10 and 12 Tons

**PORTABLE ROLLER**
Variable Weight
For economical patching.

**TRENCH ROLLER**
Simplifies road widening jobs.

Write for literature.

ESTABLISHED GALION 1907

**MOTOR GRADERS · ROLLERS**

THE GALION IRON WORKS & MFG. CO., General and Export Offices, Galion, Ohio, U.S.A.

Cable address: GALIONIRON, Galion, Ohio

# Spring Break-up No Threat to Concrete Pavement

Spring break-ups put many roads out of service for heavy traffic. Repeated freezing and thawing cycles so soften and weaken most subgrades that non-rigid pavement must be restricted against heavy loads to prevent its destruction.

In Minnesota, for example, spring break-up imposes load restrictions on about 8,000 miles—two-thirds of the state trunk system. Beginning in March some communities are entirely shut off from major truck transportation for about 90 days.

Concrete pavement is not damaged by spring break-ups. Being rigid, it has load-carrying slab strength. Loads are spread over so large an area that the pavement can carry normal loads even on greatly softened subgrade. As a result the concrete roads carry nearly all the heavy traffic during this annual spring break-up period.

All-weather service is only one advantage of concrete pavement. It is safer, too. Wet or dry, its gritty surface has uniformly high skid resistance. It reflects more light, providing maximum visibility at night. Its moderate first cost, long life and low maintenance cost mean ***low-annual-cost*** service.

For more information and help in designing and building safe, ***low-annual-cost,*** all-weather, all-year concrete highways write for your copy of a free 92-page manual, "*Concrete Pavement Design.*" It is distributed only in the U. S. and Canada.

**PORTLAND CEMENT ASSOCIATION**
DEPT. A2-28, 33 WEST GRAND AVENUE, CHICAGO 10, ILLINOIS
A national organization to improve and extend the uses of portland cement and concrete through scientific research and engineering field work

# 4 powerful reasons why you get more of what you want in 1953 CHEVROLET Advance-Design Trucks

**MORE TRUCK FOR LESS MONEY!** Chevrolet trucks list for less than any others of comparable specifications. Yet they bring you features and advantages found in few other trucks. For example, the advanced Loadmaster engine—standard in 5000 and 6000 Series heavy-duty and forward-control models (optional on 4000 Series heavy-duty trucks)—now has a new high-compression ratio of 7.1 to 1, and delivers even more horsepower than before.

**FACTORY MATCHED TO YOUR JOB!** Every unit of the Chevrolet truck you buy is balanced to the job. Tires, axles, springs, engine, frame, body and brakes form a team carefully engineered for the greatest efficiency—and the lowest cost.

**GREATER VALUE IN FEATURE AFTER FEATURE!** Two great valve-in-head engines—the Thriftmaster and the Loadmaster—provide greater gasoline economy. Hypoid Rear Axle, Unit-Designed Bodies, Flexi-Mounted Cabs and many other Advance-Design features offer value unmatched by any other truck at such low cost.

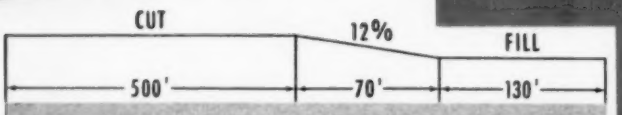
**MORE RUGGED THAN EVER!** In 1953, Chevrolet trucks are even sturdier. Bigger, more durable brakes on many models; heavier, more rigid frames and stronger construction lengthens truck life and lowers your hauling costs. See your Chevrolet dealer. Chevrolet Division of General Motors, Detroit 2, Michigan.

## CHEVROLET ADVANCE-DESIGN TRUCK FEATURES

**TWO GREAT VALVE-IN-HEAD ENGINES**—the Loadmaster or the Thriftmaster—to give you greater power per gallon, lower cost per load. **POWER-JET CARBURETOR**—for smooth, quick acceleration response. **DIAPHRAGM SPRING CLUTCH**—for easy-action engagement. **SYNCHRO-MESH TRANSMISSION**—for fast, smooth shifting. **HYPOID REAR AXLE**—for dependability and long life. **TORQUE-ACTION BRAKES**—on light-duty and medium-duty models and on front of heavy-duty models. **TWIN-ACTION REAR BRAKES**—on heavy-duty models. **DUAL-SHOE PARKING BRAKE**—for greater holding ability on heavy-duty models. **CAB SEAT**—with double deck springs for complete riding comfort. **VENTI-PANES**—for improved cab ventilation. **WIDE-BASE WHEELS**—for increased tire mileage. **BALL-GEAR STEERING**—for easier handling. **UNIT-DESIGNED BODIES**—for greater load protection. **ADVANCE-DESIGN STYLING**—for increased comfort and modern appearance.

CHEVROLET
first in demand
in value
in sales

# 51 PAYLOADS AN HOUR




Haul conditions on Grandview Construction Company's New York Thruway contract, at Selkirk, N. Y.

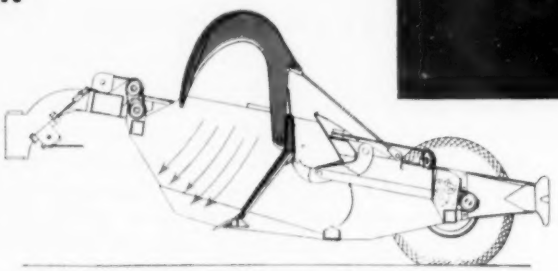
LOAD—haul—spread—and return up a 12% grade—*51 times per hour!* That's the record of the three Heiliners owned by Grandview Construction Company of Mt. Vernon, N. Y. Moving 1,400,000 cu. yds. of sand clay with a heavy water content, each Heiliner made 17 trips per hour —with an average cycle time of 2 min. 56 sec.

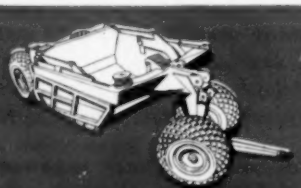
Here's the kind of fast-stepping Heiliner performance which makes earthmoving profitable. It's the kind of production that gives *you* the edge when bids are let.

## Positive "TILTING FLOOR" EJECTION HELPS SLASH CYCLE TIME!

On Grandview's New York Thruway job, spread and turn time averaged 15.9 seconds . . . spreading heavy, sticky sand clay! It's proof positive that the Heiliner's *positive* "Tilting Floor" ejection helps cut cycle time to the bone.

Heil's exclusive "Tilting Floor" ejection is the simplest type of forced ejection known. The floor of bowl is hinged back of the cutting blade. As the rear push-out ram is activated by the relatively low line pull, the floor simply tilts up to a maximum discharge angle of 75°. The load is forced out the wide front opening, while even the stickiest material is scoured from the sides and stationary back of the bowl. Material is dumped fast and clean . . . there's no extra yardage left in the bowl to cut down the size of your next load.





15 AND 16-YD. HEILINER SCRAPERS  30-YD. HEILINER BOTTOM DUMP WAGON  6, 9, 11 AND 16-YD. TRACTOR DRAWN SCRAPERS  CABLE POWER CONTROL UNITS

# WITH THREE FAST-STEPPING HEILINERS

## STEP UP *YOUR* EARTHMOVING PROFITS WITH THESE HEILINER ADVANTAGES!

For faster loading, the dirt "boils" up in the center of the bowl, loading front and back evenly so no long pull is necessary to fill clear to the back. Haul speed is *fast* . . . 25 MPH fully loaded. The powerful 200 HP Cummins diesel gives you lugging power to spare, while big 24:00 x 29 tires with wide-base rims provide the extra traction and flotation you need in soft going. Heil's exclusive, patented Hydro-Steer handles with passenger car ease . . . this easy steering control plus big, safe four-wheel brakes give operators confidence to use the full power and speed of the rig. Heil's famous planetary drive, with full 4" gear faces on sun and planet gears, provides a low-torque drive for smoother, more positive power transmission to each wheel, and permits full utilization of engine horsepower.

Heiliners are designed from the ground up with many other features to keep up a profit-making pace on every job, shift after shift. Watch a Heiliner on the job, then ask your Heil distributor for complete details about every feature.

R-2

## THE HEIL CO.

**3004 WEST MONTANA STREET • MILWAUKEE 1, WISCONSIN**

**DEPARTMENT 423**

**FACTORIES: MILWAUKEE, WIS., HILLSIDE, N. J.**

*District Offices:* Hillside, Washington, D.C., Atlanta, Cleveland, Milwaukee, Detroit, Chicago, Kansas City, Denver, Dallas, Los Angeles, Seattle.

**REMAKING A RIVER BED.** The channel of the Arkansas River is being realigned by this fleet of International crawlers owned by the C. W. Kelley Transport Company, Inc., and Rush Construction Company, shown cutting new channel through section of island.

# Speeds up Sleepy River

**RIVER CROSSING.** International crawlers reach islands to start re-channeling work by building earth ramps across the river. They worked in sand and water throughout the summer with no downtime.

**CHANGING THE CHANNEL.** Operator Kie Bayless says: "These TD-14As have more 'soup' than any other tractor their size. They just plain move more dirt."

## International crawlers speed up flow of Arkansas River as safeguard for Kansas wheat belt

Flow of the long and lazy Arkansas River is being speeded up one-third along a 30-mile stretch in Reno County as a flood prevention measure aimed at safeguarding the rich wheat belt in this Kansas County.

When the river rises just six feet, and it does periodically, it spills all over the wheat fields and causes extensive damage.

But county officials feel they have a solution. This year they launched the first portion of a proposed three-year plan involving some $50,000 expenditure each year for elimination of bad turns and islands in the river channel. This improvement will increase the flow of the river from 4.06 feet per second to 5.41 feet per second or more and it is felt this faster flow will be sufficient to keep the river in its channel.

Dirt moving for the first-year phase of the improvement is being handled by Rush Construction Company and C. W. Kelley Transport Company, Inc., with rugged red International TD-18A and TD-14A crawlers.

H. M. Dunsworth, job foreman, reports:

*"We lug these TD-18As and TD-14As down all the time. They not only have the power and maneuverability to do a bang-up dirt moving job, but that high-speed reverse sure makes us money on this river job as lots of the dozing calls for long pushes. These Internationals, and some have been used for years, have worked over two months here under miserable conditions with absolutely no downtime."*

Ask your International Industrial Distributor for details on the whole International line of money-making crawlers. Ask him, too, about his fast, ready service and speedy parts delivery. Get all the answers . . . you'll want International "Power that Pays" from now on!

**INTERNATIONAL HARVESTER COMPANY, CHICAGO 1, ILLINOIS**

INTERNATIONAL HARVESTER

**INTERNATIONAL**

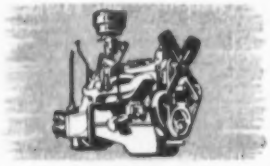
**POWER THAT PAYS**

# NEW HORSEPOWER!
# NEW BRAKING POWER!
# NEW EARNING POWER!

Biggest truck values of the year! New, just-announced Dodge trucks with features like . . .

7 high-compression engines, with 100 to 171 horsepower, give you more ton-miles per hour, more deliveries per day! New styling inside and out, tough new floors in pick-up and panel bodies, new tighter-than-ever tailgates on pick-ups and expresses! A total of more than 50 brand-new features to boost truck earning power!

More, you get such famous Dodge extra values as lightweight aluminum-alloy pistons, rivetless Cyclebond brake linings on all hydraulic brakes, moistureproof ignition, shot-peened rear axle shafts! Get more truck for your money . . . see your neighborly Dodge dealer!



**NEW!**

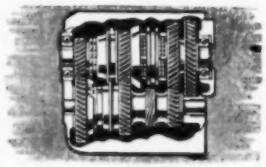
**MORE POWERFUL ENGINES!**

7 high-horsepower engines! 3 brand-new, with increased displacement, greater cooling capacity, twin carburetion available on larger trucks!

**NEW!**

**BETTER BRAKING!**

Super-safe brakes stop smoothly, easily, with less pedal pressure! New increased stopping ability on 1- thru 2½-ton trucks!



**NEW!**

**NO GEAR-SHIFTING!**

Truck-o-matic transmission with gyrol Fluid Drive available on ½- and ¾-ton models! Saves shifting, yet lets you rock out of snow, mud!

**NEW!**

**OVER 50 FEATURES!**

Reinforced cab construction, larger exhaust system, new 116″ wheelbase ½-ton pick-up! Dodge-Tint glass, higher output heaters available!

**There's one to fit your job . . . ½-ton through 4-ton. See your friendly Dodge dealer.**

# DODGE "Job-Rated" TRUCKS

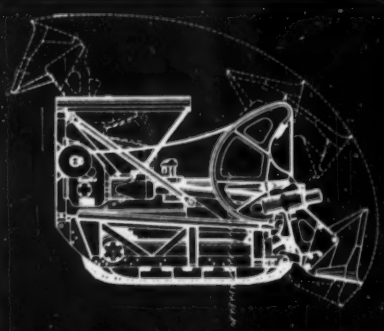
# BIG LOAD
## LITTLE EFFORT

Loads like this were considered jobs for big heavy equipment not long ago — but today loads this big or bigger can be handled easily with plenty of horsepower in reserve in the power unit.

The secret of the Eimco 104 is in better engineering, better steel castings and the rocker-arm principle described at right — where effort is applied to obtain a maximum in mechanical advantage.

Eimco 104's are heavy-duty loaders. They'll handle rock as easily as sand and gravel. Bucket sizes vary with material being loaded with an average job loading rate of between 200 and 300 yards per hour depending on job conditions.

Eimco 104's are being used for highway maintenance, heavy earthmoving, contracts, tunnels, steel mills, sand and gravel pits and many other jobs. Write for more information on Eimco loaders. Built in 6 different models for all loading jobs.



The rocker-arm principle is used on all Eimco Loaders. This principle, designed to give maximum force at the digging lip while the bucket is being worked up through the muck pile permits crowding forward at the same time so that the bucket will come up full every load.

EIMCO A431

*You can't beat an Eimco*


THE EIMCO CORPORATION

*The World's Largest Manufacturers of Underground Rock Loading Machines*

EXECUTIVE OFFICES AND FACTORIES — SALT LAKE CITY 10, UTAH, U. S. A.

*BRANCH SALES AND SERVICE OFFICES:*

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KWIK-MIX
16-S DANDIE®

# fits ALL your applications . . .

## . . . handy for intermittent use

With 17.6 cu. ft. capacity and fast mixing cycles, Kwik-Mix 16-S Dandie is ideal as a small, low-cost central-mix plant for concrete bridge construction, abutments, culverts, footings, pilings. 16-S also gives handy, mobile mixer service for intermittent use on small quantity, 2-or-3-hour jobs. Versatile is the word for it! For instance . . . by interchanging axles on the square frame, you get either side or end discharge. Change over takes less than an hour. Add the Kwik-Mix tower attachment, and the 16-S has 9-ft. discharge height . . . loads into trucks, overhead hoppers and forms. Or, mixer can be mounted on elevated platform and charged by using an extension track on the skip.

You'll find this 16-S Dandie the most versatile concrete mix plant you've ever seen! Check its automatic water system, Flow-Line discharge, double-contact skip shaker, multiple V-belt drive, and other unusual advantages in 16-S Dandie catalog. Ask Kwik-Mix distributor for your copy, or write us.

Mail to: Kwik-Mix Co., 3029 W. Concordia, Milwaukee 16, Wis.
Send us 12-page catalog on 16-S Dandie concrete mixer RS

NAME _____
COMPANY _____
STREET _____
CITY, STATE _____

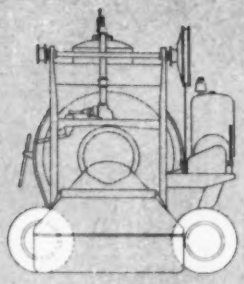
CKM336

KOEHRING PRODUCT

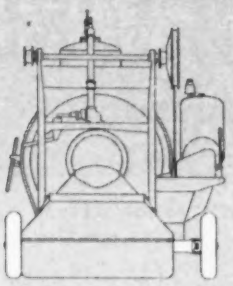
KWIK-MIX COMPANY
(Koehring Subsidiary)

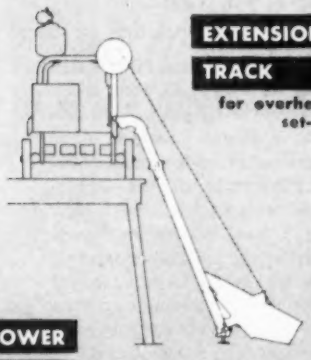
CONCRETE • PLASTER-MORTAR • BITUMINOUS MIXERS • MOTO-BUG (power wheelbarrow)
(3½-16-S) (3, 6, 10-P) (10-14 cu. ft.)

# BIG enough for central mix plant jobs



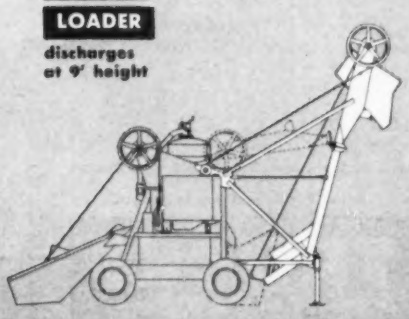
**INTERCHANGEABLE SIDE OR END DISCHARGE**
readily adapts mixer to suit operating conditions





**EXTENSION TRACK**
for overhead set-up

**TOWER LOADER**
discharges at 9' height



## 17-FT.-DEEP Parsons 310 Trenchliner®

With 45 digging feeds, this big-capacity 310 Trenchliner produces from 8" to 15½' of clean, smooth-walled trench per minute . . . digs 1½ to 4½' wide at 17' depth with single boom, and up to 6' wide at 11' depth with dual booms. 310 has full reverse of all operations for undercutting or making vertical set-ins . . . is equipped with easy-in, easy-out "Tap-In" teeth. Parsons line also includes 5 Trenchliners in smaller sizes.

**PARSONS** (Koehring Subsidiary)
Newton, Iowa

## EASY-CHARGING Johnson Lo-Bin Batcher®

Lo-Bin Trolley Batcher holds 8, 20 or 30 tons . . . is only 7½' to 9½' high for charging with front-end tractor loader. Lo-Bin has 2, 3 or 4 compartments, up to 4 weigh beams, 22 or 44 cu. ft. weigh hopper . . . or can be arranged for 2 or 3 aggregates and 1 bulk cement compartment. Efficiently serves 28-S, 16-S, 11-S, 6-S mixers. Lo-Bin is quickly dismantled, easily moved by dump truck. Optional: wheels, tires, tow-bar.

**C. S. JOHNSON** (Koehring Subsidiary)
Champaign, Illinois

## 86.7-BATCH-PER-HOUR Koehring *twinbatch*

Koehring 34-E paver hits a top output of 86.7 batches per hour (60-second mixing time). This reserve work capacity offsets normal production delays . . . assures an average of 50 batches an hour, 8 hours a day, at no increase in batching, hauling or finishing equipment. Every mixing operation is automatic, accurate, fast with split-second Autocycle control. Get more facts on big Koehring 34-E *twinbatch*. Also check rubber-tired 16-E.

**KOEHRING COMPANY**
Milwaukee 16, Wis.

Y67

IH scores again...

# NEW INTERNATIONAL TRUCKS

## *Proved as only IH can prove 'em*

**The 307 new features** in the *New* International Trucks have been . . .

**Proved** in the world's most advanced truck Engineering Laboratory at Fort Wayne, Ind., **Proved again** on International Harvester's 4000-acre Arizona desert Proving Ground.

**For profit-minded buyers.** *New* International Trucks offer an unmatched combination of values—exactly the right truck for the job, unequalled performance, lowest maintenance and operating costs, maximum driver comfort.

**Built the IH way.** Choose from 168 basic models in America's most complete truck line. Each model embodies engineering principles, used in International's continuing program of truck research and development, that have resulted in hundreds of exclusive International features which have meant greater profits for truck buyers.

**New International Trucks** are BUILT as only IH can build them, PROVED as only IH can prove them, a VALUE only IH can give you.

***Now—the features you want—in America's most complete truck line***

**New International styling** identified by the IH emblem . . . **Exactly the right power** for every job. First truck builder to offer choice of gasoline or LP gas with Underwriters' Laboratories listing in 1½-ton sizes and other models . . . **Diesel power** optional in models rated 22,000 lbs. and over . . . **Designed by drivers for drivers**—Comfo-Vision cab with one-piece Sweepsight windshield. New comfort and interior styling . . . **Steel-flex frames** proved best in the field . . . **Transmissions** to meet any operating requirement . . . **296 Wheelbases** ranging from 102 inches up . . . **Easy starting and greater fuel economy** . . . **Wide range** of axle ratios for all models . . . **Real steering comfort and control.** Sizes from ½-ton to 90,000 lbs., GVW rating. Now—See The New IH-Built, IH-Proved Internationals at your nearest International Dealer or Branch.

**INTERNATIONAL HARVESTER COMPANY • CHICAGO**

International Harvester Builds McCormick Farm Equipment and Farmall Tractors . . . Motor Trucks . . . Industrial Power . . . Refrigerators and Freezers

*Better roads mean a better America*

**INTERNATIONAL TRUCKS**

*"Standard of the Highway"*

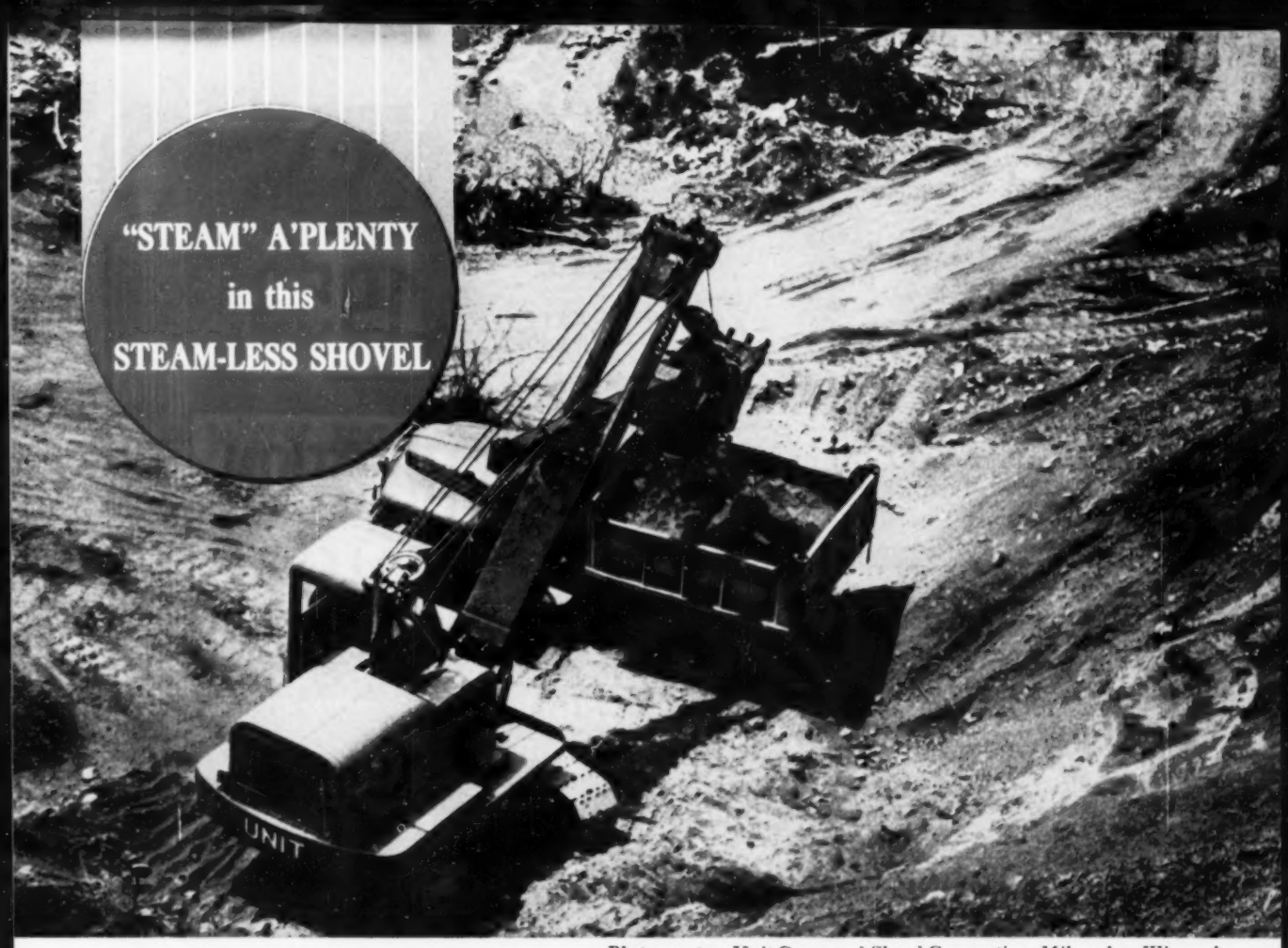
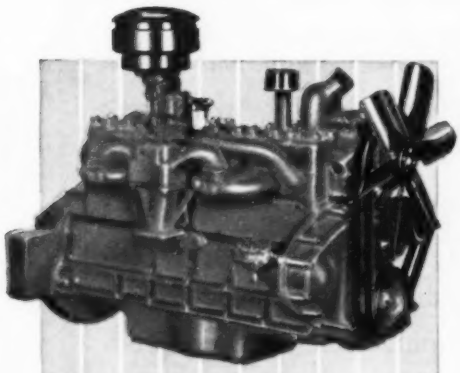



*Photo courtesy Unit Crane and Shovel Corporation, Milwaukee, Wisconsin*

## *...more work at less cost with Chrysler power and Chrysler torque converter*



Today, all over the country, gasoline-powered versions of the old steam shovel are piling up record after record for volume output, speed and economy of operation.

In the vanguard of modern earth-moving equipment is Unit's model 614 one-half yard shovel, powered by the Chrysler Model 16 Industrial Engine and featuring the Chrysler torque converter as standard equipment. Unit operators find this an ideal combination since, in giving them fast, dependable power without risk of stalling, work output is *increased* while fuel consumption is actually *decreased*. Moreover, the smooth application of power through the torque converter eliminates shock loads to engine and equipment, thereby reducing maintenance costs.

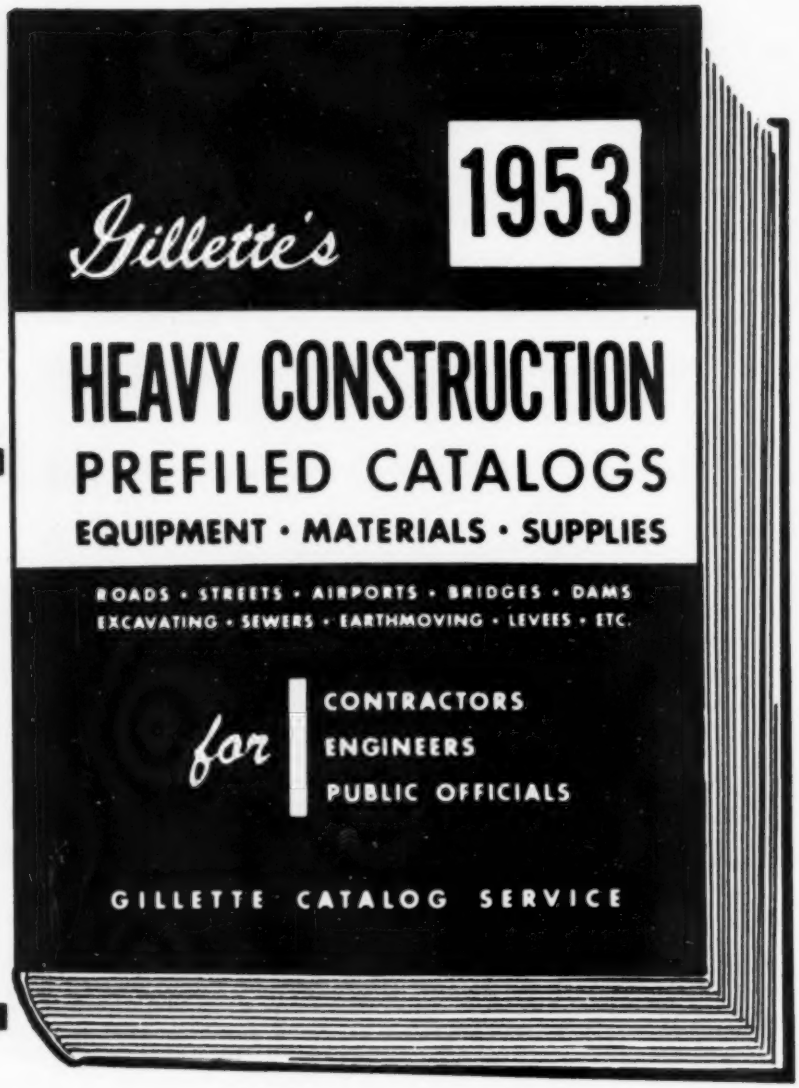
This is but another example of how Chrysler is meeting the many and varied requirements for industrial power. For example, Chrysler can supply manufacturers with a corrosion-resistant or fungus-treated electrical system, a propane or natural gas-burning carburetor, three, four or five-speed transmission, standard or gýrol Fluid Drive.

Despite all these advantages, Chrysler Industrial Power is not expensive. Production-line methods adapted to specialized industrial engine building, provide a custom-built engine at mass-production prices.

See a Chrysler Industrial Engine Dealer. Or if your problem is special, write us direct:
***Dept. 122, Industrial Engine Division
Chrysler Corporation, Trenton, Mich.***

# CHRYSLER
## *Industrial Engines*

HORSEPOWER WITH A PEDIGREE




***It's in your Office Now . . .***
**(or will be soon)**

**KEEP IT HANDY—**
**USE IT OFTEN—**

# *Your most useful source of Buying Information*

- This book saves you cabinet and floor space and the secretarial time that would otherwise be spent in classifying and filing individual manufacturers' catalogs.
- It saves you, too, the time and trouble of writing to manufacturers for the information you need. Here are enough facts to enable you to study the product that interests you and to decide whether to call your local dealer or distributor for decisive action.
- When you want information quickly, on a certain class of product or on the product of a specific manufacturer, turn first to the index for the name or trade name of the product in which you are interested and then to the manufacturers' catalog which is arranged in alphabetical order by manufacturers' name.

When you are in the market for new construction equipment, materials or supplies, turn to Gillette's Heavy Construction Prefiled Catalogs for information on what to buy and from whom. Here's the swift, economical and satisfying way to make your pre-purchase studies. In this single volume America's leading manufacturers of these products have placed their catalogs, many of them specially designed for your convenience—"boiled down" to save you time and energy.

# CATALOGS...

## *the way you asked for them*—PREFILED

Contractors, engineers, public officials PREFER receiving manufacturers' catalogs PREFILED rather than to have individual catalogs sent by manufacturers. Individual catalogs are usually mislaid or thrown away.

The manufacturers listed below have followed your wishes—and at considerable expense. Through the PREFILED method they have supplied you with catalog information on their products in the current 1953 edition of Gillette's Heavy Construction Catalog File (See opposite page). Be sure to take advantage of this information. Use the Gillette Catalog File all the time. Keep it handy every day—every week. Use it often. Consult the Catalog File when you want information before buying new equipment, materials or supplies.

### Here is the list of manufacturers who have supplied you with buying information on their products.

Adams Manufacturing Co., J. D.
Allis-Chalmers Manufacturing Co.
All Purpose Spreader Company
American Air Filter Co.
American Bosch Corporation
American-Coleman Company
American Manganese Steel Division
American Marietta Co.
American Steel & Wire
American Tractor Equipment Corp.
Anthony Company
Armco Drainage & Metal Products, Inc.
Arrow Manufacturing Company
Austin-Western Company

Baldwin-Lima-Hamilton Corp.
Badger Machine Co.
C. L. Ballard
Beardsley and Piper
Bicknell Manufacturing Company
Briscoe & Son, E. V.
Bros Boiler & Mfg. Co., Wm.
Buda Company, The
Buffalo-Springfield Roller Co., The
Butler Bin Company

Carey Manufacturing Co., The Philip
Carson Company, H. Y.
Carter Co., Ralph B.
C. H. & E. Manufacturing Co., Inc.
Chausse Manufacturing Co., Inc.
Cleaver-Brooks Company
Cleveland Formgrader Co., The
Cleveland Frog and Crossing Co.
Cleveland Trencher Company, The
Clipper Manufacturing Co.
Clyde Iron Works
Concrete Surfacing Machine Co.
Crockett Brothers
Cummer & Son Company, The F. D.
Cummins Engine Company, Inc.

Davenport Besler Corporation
Detroit Diesel Engine Division
Dixie Tally-Ho, Inc.
Dorsey Trailers

Eagle Crusher Co., Inc.
Electric Tamper & Equipment Co.
Erie Steel Construction Company

Felker Manufacturing Co.
Fisko Brothers Refining Co.
Flexible Road Joint Machine Co., The
Flintkote Company, The
Foundation Equipment Corporation
Frace Manufacturing Co.

Gallon Allsteel Body Company
Gallon Iron Works & Mfg. Company
Gar Wood Industries, Inc.
General Excavator Co.
General Motors Corporation
Gledhill Road Machinery Co., The
Goodall Rubber Company

Haiss Mfg. Co., Inc., Geo.
H. & L. Tooth Co.
Hammermills, Inc.
Harnischfeger Corporation
Hauck Manufacturing Co.
Heltzel Steel Form & Iron Co.
Hercules Motors Corporation
Herman Nelson
Highway Equipment Co., Inc.
Hose Accessories Company
Hough Co., The Frank G.
Huber Manufacturing Co., The

Jackson Vibrators, Inc.
Johnston and Jennings Co.
Joint Equipment Company, Inc.
Joy Manufacturing Company

Keystone Asphalt Products Company
Kiesler Co., Jos. E.

La Crosse Trailer Corporation
Lence-Neville Co., The
Le Roi Company
Lincoln Electric Company, The
Littleford Bros., Inc.
Lubriplate Division

Marlow Pumps
Master Vibrator Company
Michigan Power Shovel Company
Minneapolis-Moline

Naugatuck Chemical Division
Noble Company

Oliver Corporation, The
Omaha Standard
Onan, D. W. & Sons, Inc.
Osgood-General
Ottawa Steel Products, Inc.
Owen Bucket Co., The

Pacific Car and Foundry Company
Page Engineering Company
Philadelphia Textile Finishers, Inc.
Phoenix Products Co.
Pioneer Engineering Works
Pitman Manufacturing Company
Porter, Inc., H. K.

Republic Steel Corporation
Riddell Corp., W. A.
Rogers Brothers Corporation
St. Paul Hydraulic Hoist
Salem Tool Company, The
Sauerman Bros., Inc.
Schramm, Inc.
Service Supply Corporation
Servicised Products Corp.
Shunk Manufacturing Company
Standard Steel Corporation
Sterling Engineering & Mfg. Co.
Stow Manufacturing Company
Sumner Equipment Limited
Super-Compactors, Inc.
Symons Clamp & Manufacturing Co.
Syntron Company

Talbert Construction Equip. Co.
Tarrant Mfg. Co.
Thurman Machine Co., The
Timken Roller Bearing Co., The
Titan Chain Saws, Inc.
Transport Trailers, Inc.
Tuthill Spring Company

Universal Engineering Corp.

Vibro-Plus Products, Inc.
Vulcan Tool Manufacturing Co.

Warner & Swasey Co.
Waterloo Foundry Co., Inc.
Waukesha Motor Company
Wellman Engineering Co., The
Whitestown Trencher Co., Inc.
Wico Electric Company
Williams Form Engineering Corp.
Winter-Weiss Co., The
Wyoming Valley Equipment Co., Inc.

Yaun Manufacturing Co., Inc.

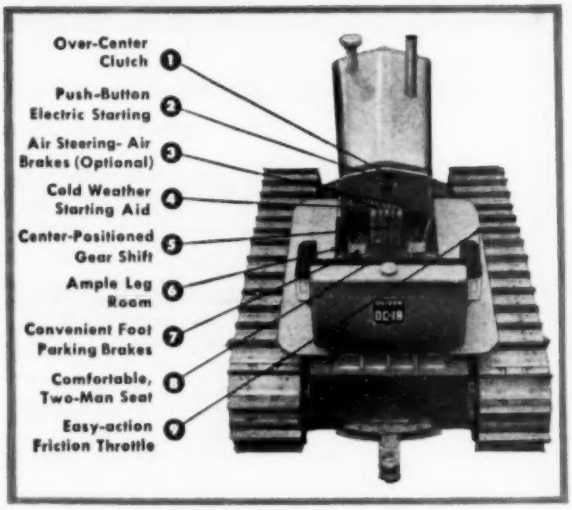
# Owners' pride . . . Operators' delight
# the NEW OLIVER "OC-18"

**OWNERS** can't say enough good things about the new Oliver "OC-18." They keep telling us how it does more work . . . how that full 133* drawbar horsepower gives it plenty of power for the really tough jobs . . . about its low operating and maintenance costs . . . and how the operators and mechanics like it.

**OPERATORS** are even more enthusiastic. It's the first big tractor they've found that is designed to make life easier for them. They tell us that toward the end of a long day on the "OC-18," they are much less fatigued, much more fit to continue giving top performance. The illustration shows clearly the 9 important "easy operating" features of the "OC-18." No other tractor boasts all these. They make the "OC-18" "the operators' dream come true."

Ask your Oliver Industrial Distributor to arrange a demonstration. Or if you prefer, write to The Oliver Corporation, 400 W. Madison St., Chicago, Illinois.

*OFFICIAL NEBRASKA TEST NO. 489

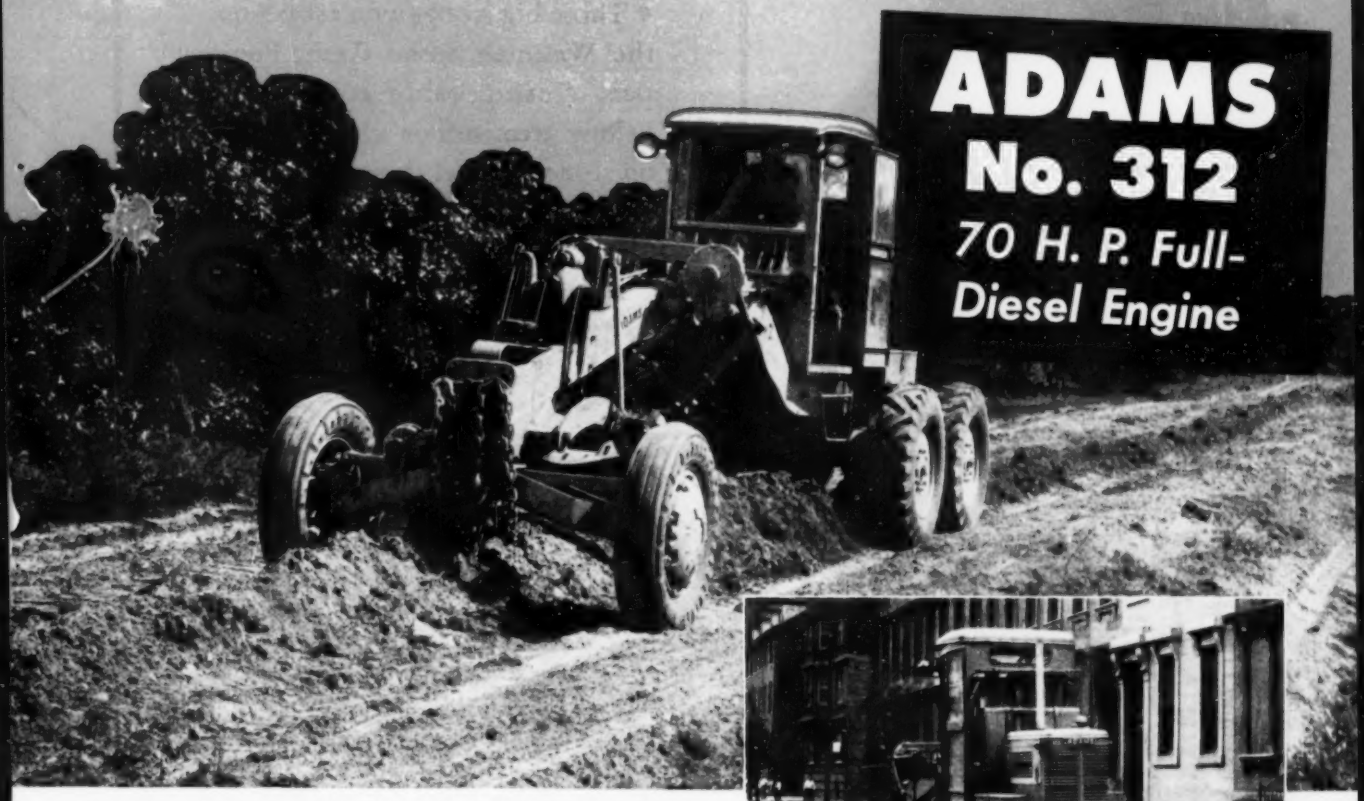

Over-Center Clutch 1
Push-Button Electric Starting 2
Air Steering- Air Brakes (Optional) 3
Cold Weather Starting Aid 4
Center-Positioned Gear Shift 5
Ample Leg Room 6
Convenient Foot Parking Brakes 7
Comfortable, Two-Man Seat 8
Easy-action Friction Throttle 9

## THE OLIVER CORPORATION

**400 West Madison Street, Chicago 6, Ill.**

*A complete line of industrial wheel and crawler tractors*

# Looking for a Medium-Priced Motor Grader with Big Capacity? — Investigate the



● If your requirements call for a motor grader with near heavy-duty weight and performance-ability—*at a moderate price*—the Adams No. 312 is made-to-order for you . . . Outstanding features include:

**Husky Diesel Engine:** Plenty of power and lugging ability—easy starting—dependable, economical.

**8 Forward Speeds:** 2 more than most graders. A correct speed for each operation—saves time, speeds work.

**Positive Mechanical Controls:** Dependable, accurate adjustments—easy, natural steering.

**Wide Range of Blade Positions:** Quick, easy adaptation to all kinds of work.

**Big, Comfortable Cab:** Roomy convenience for maximum operator efficiency—2-way adjustable seat.

**Strong, Well-Balanced Construction:** Machine will do much more work and last twice as long as an overworked small grader.

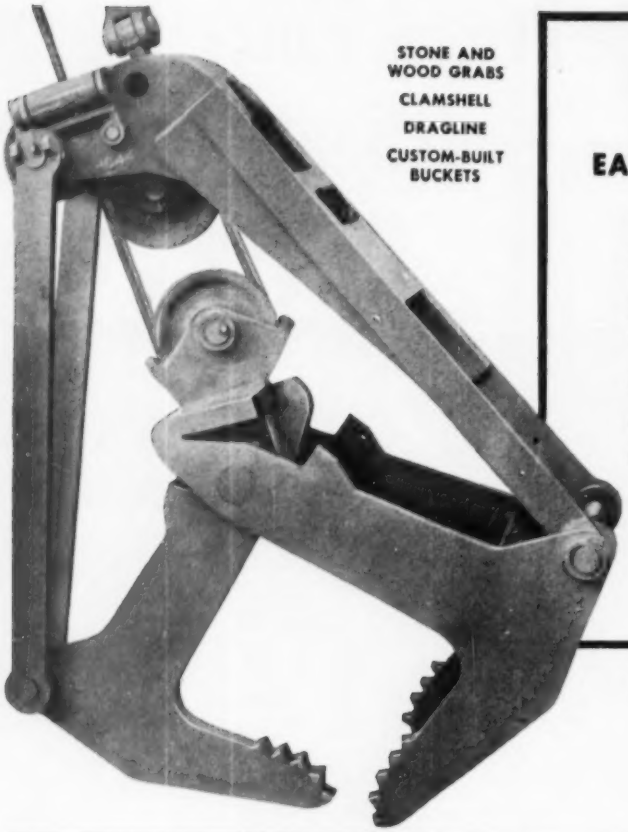
**Optional Equipment:** Scarifier—bulldozer—snow plow—big front tires—power steering, etc.

Let your Adams dealer demonstrate the time-saving, money-saving advantages of the No. 312.

**J. D. ADAMS MANUFACTURING CO. • INDIANAPOLIS, IND.**

*Make your next motor grader an*

**ADAMS**



STONE AND WOOD GRABS
CLAMSHELL
DRAGLINE
CUSTOM-BUILT BUCKETS

# WELLMAN

## EASY HANDLING OF LARGE STONES

● Those big stones won't slip from the Wellman Stone Grab. Four-part closing cable reeving develops tremendous closing force on stones. Model shown has 5-ton capacity, 4½ foot jaw spread. Other capacities available.

***Want Facts?*** *Send for free descriptive bulletins.*

**THE WELLMAN ENGINEERING COMPANY**
**7000 Central Avenue**
**Cleveland 4, Ohio**

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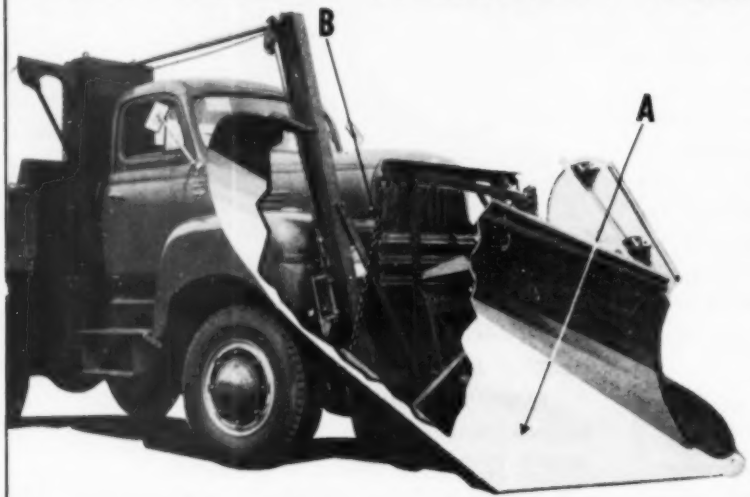
# *NO SIDE THRUST* with a FRINK




*Frink Reversible Type, One-Way Type, and V-Type Sno-Plows are interchangeable on the same truck attachment.*

NOTICE: If you have had to wait months for replacements for your present equipment then you will appreciate the service that we can now offer you.

The unique feature of the Frink V-Plows that prevents side thrust is embodied in the arrangement of the heel adjusting Chains shown in the cutaway photo at left. Frink Sno-Plows are so designed that the snow raises on the mouldboard (Fig. A.) above the adjacent snow before it is carried to the side.

The weight of this raised snow is transferred through the Heel Chains (Fig. B) to the truck attachment and downward to the front wheels – thereby increasing pressure against the road surface and preventing side slip.

These two factors cause the plow to push easier and entirely eliminates side thrust. Only in Frink Plows are these patented features combined for your benefit.

**For details of this Sno-Plow write for catalog to nearest address below, Box RS-532.**

FRINK SNO-PLOWS, INC., CLAYTON, NEW YORK
DAVENPORT-BESLER CORP., DAVENPORT, IOWA
FRINK SNO-PLOWS of CANADA, LTD., TORONTO, ONT.

FRINK SNO-PLOWS

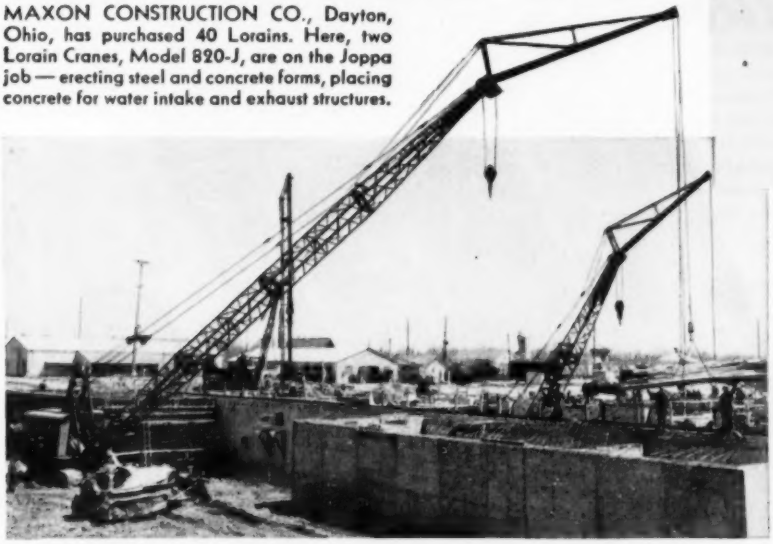
# JOPPA JOB REPORT

**JOPPA, ILLINOIS, PROJECT OF ELECTRIC ENERGY, INC. TO SUPPLY POWER FOR ATOMIC ENERGY COMMISSION PLANT, PADUCAH**

# 18 LORAINS

## HELP BUILD NEW 1,300,000 K. W. $56,000,000 POWER PLANT

MAXON CONSTRUCTION CO., Dayton, Ohio, has purchased 40 Lorains. Here, two Lorain Cranes, Model 820-J, are on the Joppa job — erecting steel and concrete forms, placing concrete for water intake and exhaust structures.



EBASCO SERVICES, Inc., New York City, prime contractors on the huge Joppa project, use two Lorain Cranes, Model 820-J, to erect one of the many structures. Ebasco has purchased 11 Lorains.

EDGAR STEPHENS & SONS, Inc., Cairo, Illinois — a 5-time Lorain owner — supplies concrete for the project. These two 1-yd. Lorain Clamshells, Model 50-K, on 14 ft. long crawlers, unload, stockpile materials and charge a 30-yd. bin.

SAMUEL KRAUS CO., St. Louis, Missouri, has 3 of their 4 Lorains on their 1,000,000 cu. yd. earthmoving contract. A 20-ton Lorain Moto-Crane is shown unloading cars.

Big jobs — big names — and Lorain shovel-cranes go together. Here, in the making, is one of the world's greatest centers of electric power. Located on the north bank of the Ohio River, the big Joppa project will put forth 1,300,000 kilowatts that will feed the vital $700,000,000 Atomic Energy Commission plant across the river at Paducah. Two mammoth generating stations are being built — and Lorains are scattered all over the job.

It's a big job — all the way. Big name contractors are at work. Four of them moved in 18 Lorains to handle a wide variety of jobs. These four Lorain owners, named in the photo captions, have purchased a total of 60 Lorains.

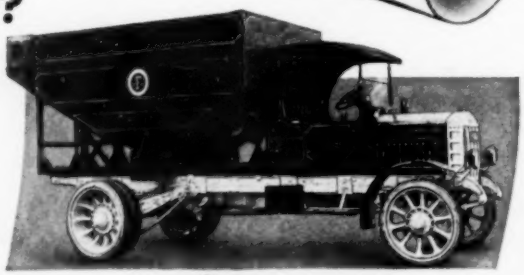
Big jobs — big names — and Lorains go together — for reasons you would expect. Dependability through quality design. Selection to answer every job need. Experience that has proved Lorain performance. Big job — or small — these same reasons will pay you to check with your Thew-Lorain Distributor for your very next shovel-crane need!

**THE THEW SHOVEL CO.**
**LORAIN, OHIO**

**THEW LORAIN®**

## Can you name it?

Chain drive, solid rubber tires, spoked wheels, and fancy striping were common features on most trucks in 1918; but this old truck also sported something "new"—a specialized body with side chute discharge. This line of trucks is still produced under its original name, but is now owned by another truck manufacturer. If you can't name it, write us.



# PERFECTION
# BODIES and HOISTS
## - A Known Value!

There's never any guess-work about buying PERFECTION Bodies and Hoists.

You *know* that they are engineered with efficient application of power thrust and leverage . . . neutralization of stresses and strains . . adequate safety factors . . . and for easy installation.

You *know* that PERFECTION Bodies and Hoists are strong and durable — constructed of heavy weight materials . . . with rugged bracing and welding . . . and highest quality workmanship.

You *know* that when your choice is PERFECTION — an outstanding service record for the past 35 years backs up your judgment.

**Write for literature today.**

**Dept. R-23**

Photo shows a PERFECTION No. 254 Dump Body of 5-yd. capacity increased to 12-yd. capacity by the addition of sideboards and top box. Equipped with a PERFECTION Isodraulic ROLL-A-LIFT.

STAKE and EXPRESS BODIES

STANDARD and SPECIAL DUMP BODIES

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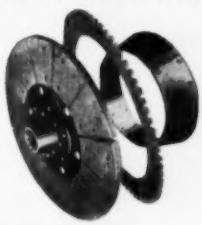

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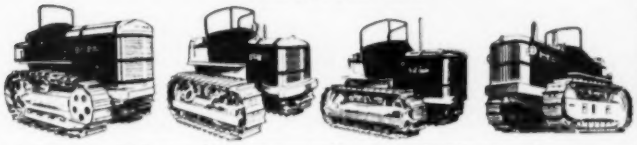

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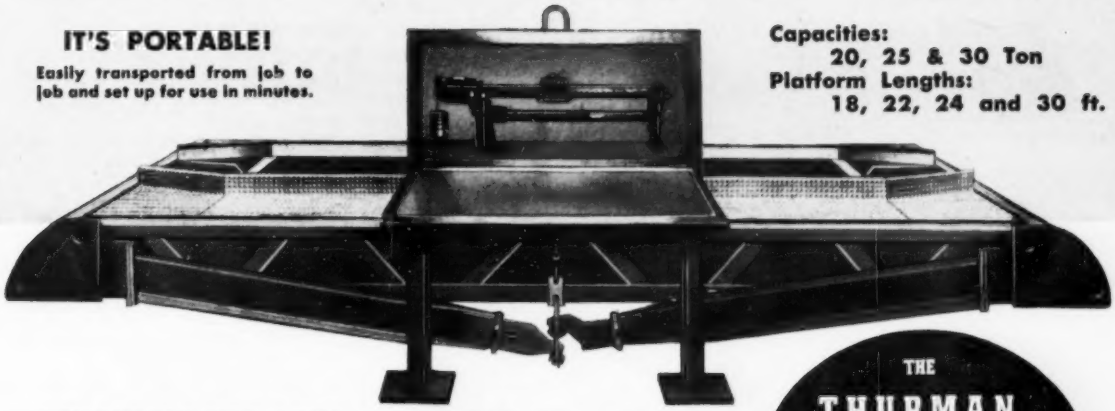

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The assembled scale can be moved by merely removing six bolts which hold the side levers in place. The complete scale can then be lifted as a unit and loaded onto a truck. Once positioned, it can be ready for use in minutes.

**ACCURATE** Perfectly balanced for lifetime accuracy. Wide steel bases, at both ends, support scale therefore require no concrete footing. Easy to read weighbeam is chrome-plated. Other vital parts are electro-plated against corrosion.

THE THURMAN PORTABLE TRUCK SCALE
Est 1918

**THURMAN MACHINE CO.** SCALE DIVISION
156 North Fifth Street
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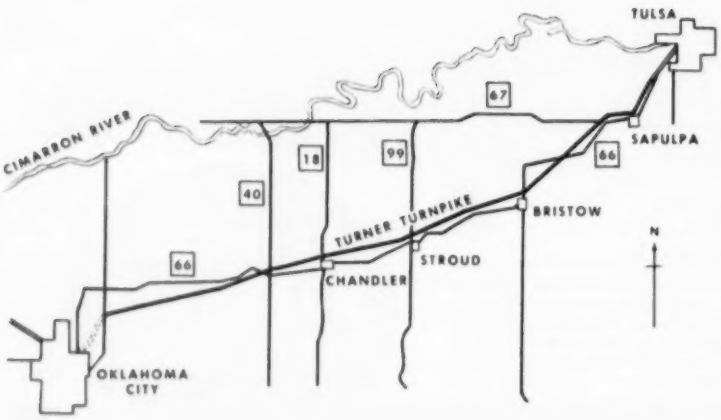
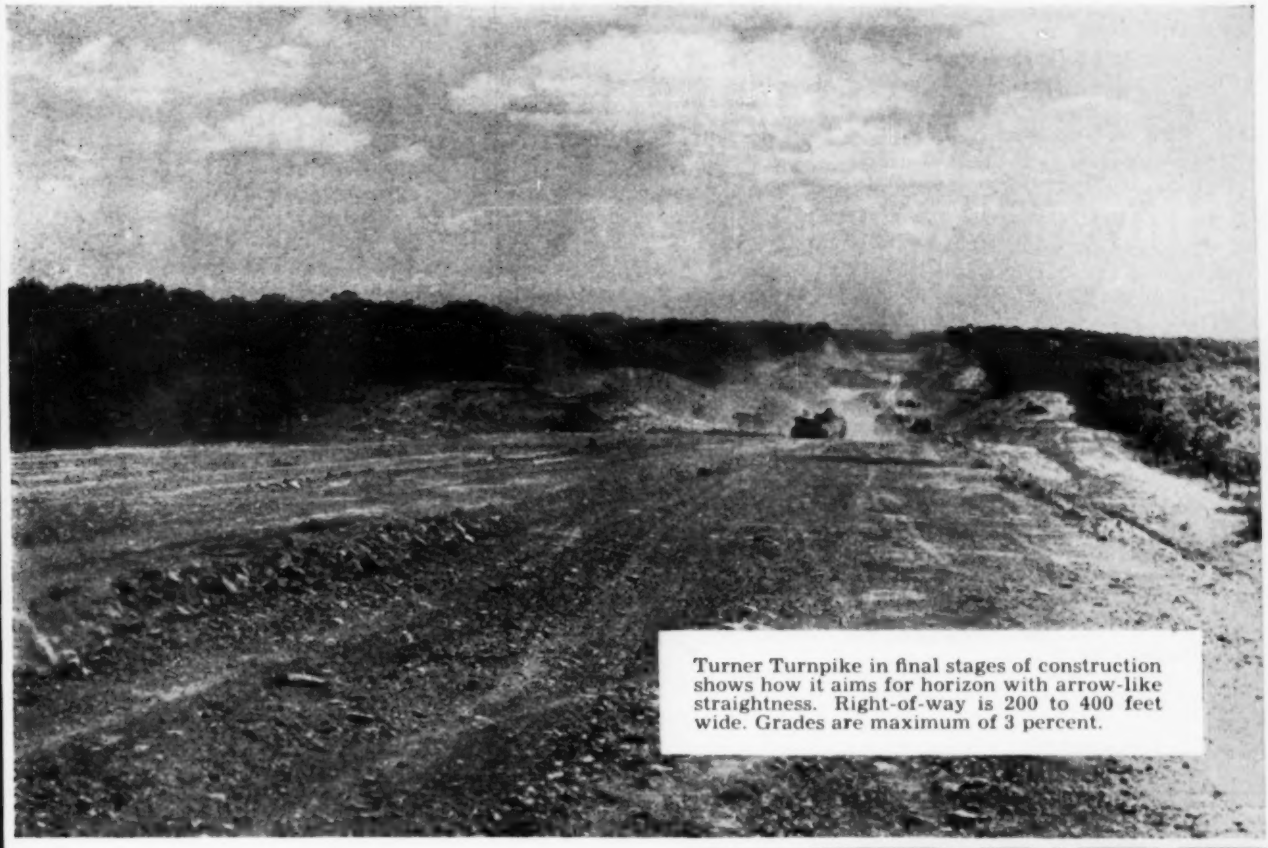
## Performance on the Turner Turnpike makes the Allis-Chalmers AD-40 Grader

# A New Regular for Gillioz




One of the most modern highways in the Southwest will soon connect Oklahoma City and Tulsa, Oklahoma. Twin 24-foot roadways will save travelers almost a full hour of driving time on this 88-mile stretch; 12-foot paved shoulders, slight grades and long curves will make driving easier and safer, too.



Turner Turnpike in final stages of construction shows how it aims for horizon with arrow-like straightness. Right-of-way is 200 to 400 feet wide. Grades are maximum of 3 percent.

M. E. Gillioz, Monette, Missouri, was awarded three of the Turner Turnpike contracts; each for clearing, grading culvert work and fine grading. Gillioz, with half a century of experience in earth moving, has one of the largest contracting organizations with one of the biggest fleets of Allis-Chalmers tractors in the area. And now there's a new regular in the Gillioz fleet — an Allis-Chalmers heavy-duty AD-40 motor grader.

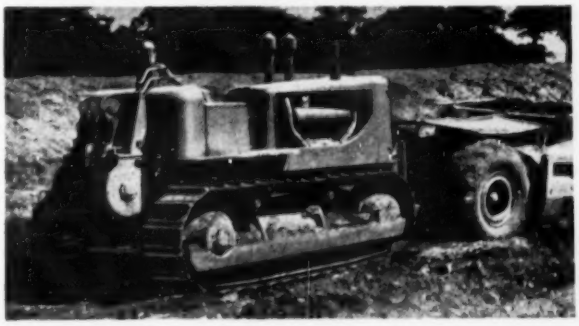
The AD-40 proved to Gillioz on his Turner Turnpike jobs that it represents real progress in motor grader design. His operators could see the front wheels and both ends of the blade well whether they were rolling big windrows or doing fine finishing. There are a number of reasons: (1) A-C's single member frame goes all the way from the front axle to the platform; (2) the front corners of the platform are tapered; (3) the size of the lift cases has been cut down to eliminate blind spots; (4) the control box has been lowered, and assemblies have been eliminated from the front panel to provide better visibility of the work area directly ahead of the operator.

Gillioz men also like the operating comfort built into the AD-40. It has ample leg room for stand-up operation. And for easy, comfortable sit-down work, the AD-40 has a seat that rolls forward at a touch plus an adjustable-height steering wheel.

These advantages teamed up with a new kind of power steering and outstanding service simplicity to make the AD-40 a new regular for Gillioz. It will pay you to consider putting this job-proved grader on *your* team, too. See your nearby Allis-Chalmers dealer soon for all the facts.

Allis-Chalmers AD-40 finish grades one stretch of the new turnpike. The completed highway will be divided by 15-foot landscaped center mall.

An HD-20, one of the Gillioz fleet of ten Allis-Chalmers torque converter tractors, sends a rubber-tired scraper off to the fill with a flying start.



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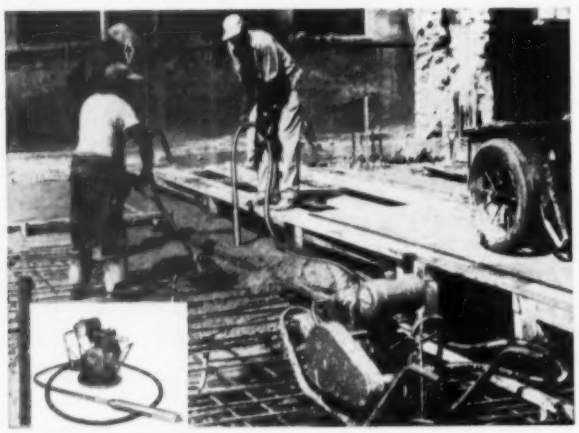

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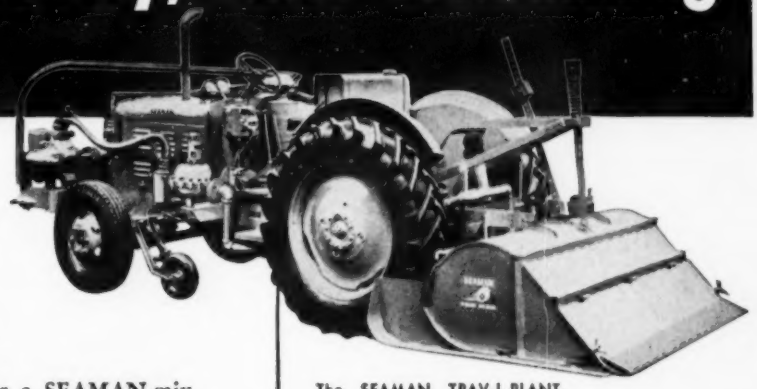
are manufactured for all crawler type & rubber-tired tractors. Teeth are removable, replaceable and are capped with abrasion resistant points. Tooth spacing changeable to suit job at hand. Pusharms are optional, may be ordered to fit any standard pusharm.

Manufactured by,

**SHIRLEY EQUIPMENT CO.**

**Harbor Side Park** **Providence 5, R. I.**

# SEAMAN-Mixing eliminates costly, time-consuming windrows



The SEAMAN TRAV-L-PLANT. Pump, tachometer controls and spray bar handle bitumen or water. Gasoline or diesel powered.

SEAMAN-mixing for all in-place operations is basically the lowest cost method of constructing a strong, high load-bearing base. But there's a further and substantial saving in time and money because windrowing is not needed for a SEAMAN-mix.

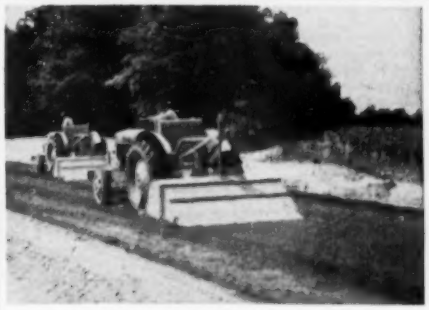
When you use the SEAMAN MIXER you simply blade your aggregates to the specified depth and shape them to the final crown and grade. Add your binder — and put the SEAMAN to work. That's all! The SEAMAN leaves the mix shaped exactly as the grader left it. No further blading needed. It's ready for final compaction. In short, the SEAMAN is a mixer — *and a finisher.*

The SEAMAN means more work per day. Longer sections can be processed because it eliminates the need for windrows. The blades are free for other work — another good reason that road men who are behind time on construction and maintenance schedules — "catch-up" fast when a SEAMAN takes over the mixing and finishing job.

Reclaimed bituminous mat is scarified and spread flat over subgrade, then shaped to crown and grade. The SEAMAN reduces the lumps to original aggregate size leaving treatment ready for compaction.

**Here's a book to tell you about SEAMAN-mixing in all types of stabilization. Entitled *"Soil Stabilization Methods"*, it completely describes construction techniques. Write for it today. Ask for Bulletin 25.**

Re-shaping a SEAMAN-mix is not needed. Sheepsfoot roller follows directly behind the SEAMAN in final compaction.



Two SEAMAN Self-Propelled units mixing for gravel-asphalt highway.

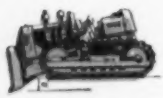
**SEAMAN MOTORS, INC.** 291 N. 25TH ST. MILWAUKEE 3, WIS.

# More Push at the Blade!

# NEW 15X DOZER! (No Pushbeam)

## More Powerful, More Rugged, but Still Highway Width!

Higher, Faster Lift—full 39½ inches above ground. Unusually good center of gravity affords excellent leverage and maximum traction with blade in any position.



Deeper, Faster Bite—full 15½ inch drop below ground. Positive down pressure, elimination of "bounce", and steeper approach angle puts—and keeps—blade down deep.

Baker's revolutionary, no pushbeam, highway width 9X dozer proved that *it could be done!* Now . . . Baker presents a *bigger, more powerful* edition—the Baker 15X—combining the famous Baker "roll action" 96 inch-wide blade with the 109 drawbar hp of A-C's HD-15.

The successful result of painstaking design and exhaustive testing, the big-capacity 15X utilizes Baker's specially engineered hydraulic lifting mechanism to direct every ounce of horsepower to where it counts most—*at the dozer blade!*

*Now!* . . . ask your Baker, Allis-Chalmers dealer for complete information about this completely new Baker 15X.

**THE BAKER MANUFACTURING COMPANY, SPRINGFIELD, ILLINOIS**

### Check These Features!

• Legal Highway Portability—only 96" wide • Big Yardage Moldboard • More Horsepower at the Blade • Sure Footed—greater track oscillation • Working Center of Gravity • "Operator-Ease" Control • Design for Easy Servicing • Lighter—Less Cost.

*Always Look to Baker for the Next Advancement—First*

If it's a "QUICK-WAY," it's a MONEY MAKER

# The World's Leading Truck Shovel

# "QUICK-WAY"

"QUICK-WAY" Model J Dragline

"QUICK-WAY" Model S Shovel

"QUICK-WAY" Model E Trench Hoe

"QUICK-WAY" the original truck shovel and always the standard, has for 30 years demonstrated its versatility and adaptability, as well as its superb engineering and long lasting construction — not only in the United States but in 65 foreign countries as well.

"QUICK-WAYS" get to and from the job faster — up to 50 miles an hour on the highway. They're quickly convertible in minutes — an attachment for every job, with four booms, shovel, scoop, trench hoe and crane. As a dragline, clamshell, pile driver, log grapple, magnet, silage or hay fork, "QUICK-WAY" is a fast moneymaker. Crane hook, concrete bucket and other special purpose tools are available.

In "QUICK-WAY" you get fine construction, all steel for strength and lightness, accurate balance. High capacity to weight ratio. Quality construction means longer life — more profits on a small investment. Economical to buy. Write today.

***You can mount basic unit on your own truck or purchase complete with your choice of trucks.***

**Model L** 10 Ton Crane, ½ Yd. Shovel, 7½ to 10 Ton Truck
**Model E** 7½ Ton Crane, 4/10 Yd. Shovel, 5 to 7½ Ton Truck
**Model S** 5 Ton Crane, ⅓ Yd. Shovel, 2 to 3½ Ton Truck
**Model J** 3 Ton Crane, ¼ Yd. Shovel, 1½ to 2½ Ton Truck

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**"QUICK-WAY" TRUCK SHOVEL CO.**
**Dept. 117 • 2401 East 40th Ave.**
**Denver, Colorado • U.S.A.**

Please send me complete details on "QUICK-WAY" truck shovels — four different models for large jobs and small.

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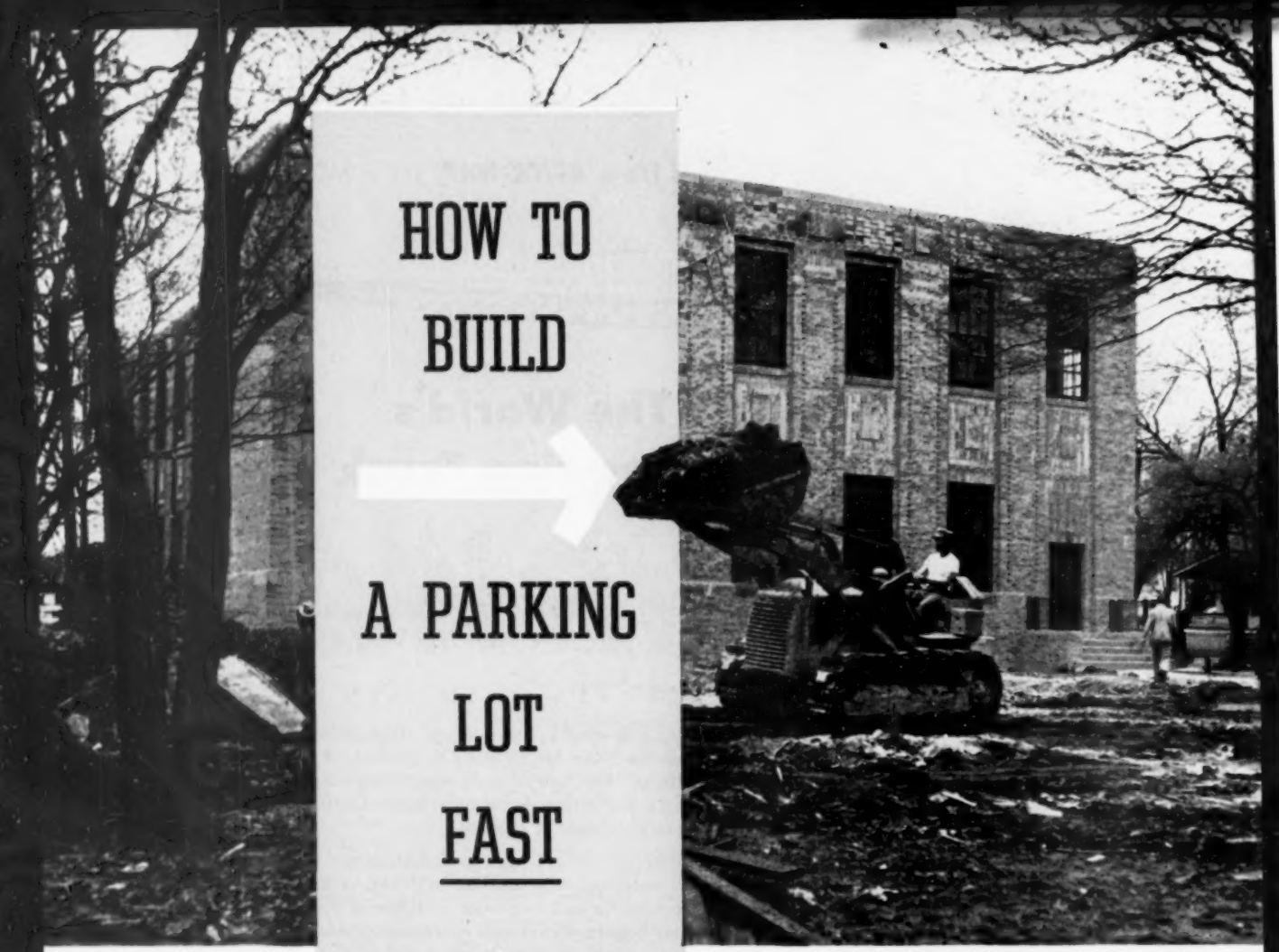


# HOW TO BUILD A PARKING LOT FAST

This busy Caterpillar Diesel HT4 Shovel is clearing land in a hurry for an Ohio Bell Telephone Company parking lot in Cleveland. Contractor is Henry Miesz of South Euclid, Ohio.

The versatile Cat Shovel can get in and out of places bigger specialized equipment can't touch. Because its bucket is wider than any part of the tractor, it works close to walls and trees. The operator enjoys perfect visibility, too: all hydraulic connections are completely enclosed—no hoses or plumbing to interfere. It's a fast shovel . . . one that can raise and dump its bucket at the same time.

There's plenty of strength built into this machine, too. Its frame and mounting and lift arms are all welded and cross braced. The bucket has a heat-treated high carbon steel cutting edge. And there are 11,250 pounds of push at that cutting edge.

Like all Caterpillar machines, this shovel is a rugged, dependable, economical piece of equipment. Your Caterpillar Dealer will gladly demonstrate its advantages. He's the man to see, too, for service and for the genuine Caterpillar parts which guarantee you the kind of quality that's built into every one of these big yellow machines.

CATERPILLAR TRACTOR CO., PEORIA, ILLINOIS

**CATERPILLAR**

REG. U. S. PAT. OFF.

DIESEL ENGINES
TRACTORS • MOTOR GRADERS
EARTHMOVING EQUIPMENT

# A Great Team Honors Its Leader

Recently a contractor who has received many honors in life, received one which has peculiar significance to engineers and contracting people everywhere. H. W. Morrison, president of Morrison-Knudsen Company, Inc., has been given a bronze plaque commemorating the 40th anniversary of his founding and continuous management of M-K.

In these restless times when engineers and construction men move about from job to job, the facts behind this award are worthy of notice. Much has been heard about this company's far-flung activities which have run into the hundreds of millions of dollars covering projects all over the world. Less well known is the fact that the company has been built to its phenomenal success by the teamwork of veteran employees who have found it worth while to stick with one company for decades if not for life. Last year 76 employees were added to the roster of 460 employees previously enrolled in the company's 10 to 30 year service club.

Mr. Morrison spoke his feelings in the firm's employee magazine. "Of course it is pleasant, and richly gratifying," he said, "to honor and to wax sentimental about the sturdy oaks in the company's well-grown forest of able men—including a few now retired from regular duty, but whom we never entirely give up as valuable counsellors, eagerly welcomed at our business and social gatherings.

"To the management and to all regular employees of M-K, our annual recognition of this large and growing body of service veterans has a meaning more than sentimental. The highly practical fact is that the strength of our organization is measured by the strength in numbers, ability and loyalty of its permanent leadership.

"Most of these well-schooled construction experts are in M-K domestic service, but many are now valuable cogs in subsidiary or affiliated companies in foreign lands. Wherever they are, this dependable large nucleus of leading M-K constructors is our assurance of continuing success."

What might be added here is that the average man—even in these boom times—finds the best financial reward, the most security, and the most satisfying career by staying put and seeking promotion from the inside.

Remember the time—not so far back—when a "contractor" was a fellow with his desk under his hat, who "let 'em all go" between jobs? The development of such stable, permanent companies as M-K is a measure of the fact that contracting has indeed "come of age."

## Tricky trucker ads

The trucking industry, which is spending huge sums to woo the public to its side of the highway taxation question, seems to be suffering from some very bad advice from its public relations experts.

The latest ad in the campaign running in national business magazines bears the title "Why a Modern Truck Doesn't Damage the Roadbeds." Any grade school boy could tell you that this is a dishonest inference. Abraham Lincoln said something about fooling all the people.

Behind this over-simplified statement lies a very complex engineering problem, involving the behavior pattern of roadbeds under load repetitions. To be sure, any one truck will not damage the road *if* the truck is not too heavy for the road, or *if* the road is strong enough for the truck—put the question either way you like. This "if" is one of the most important economic questions involved in modern highway planning, financing and design. On its answer will depend what kind of a square deal the tax paying public will get for its support of highway programs.

## Uncle Sam: Withdraw!

Different organizations promoting better highways often disagree, but most of them seem to be united on the one topic lately. That is the proposal that the Federal government get out of the field of gasoline taxation.

The advocates of this idea take the position that the gasoline tax is traditionally a prerogative of the various states, and extremely important to these states because the bulk of the funds to support state highway construction comes from such state taxation.

The proposal is sound, we think, in that it might encourage state legislatures to increase state taxes following such withdrawal, and thus restore home rule in state highway work.

Some organizations and individuals advocate that the government continue its present gasoline taxes, excise taxes on automotive products, and other road-user revenues totaling $2½ million dollars a year, but that in return that federal aid be greatly increased. In the long run the financial initiative on state highway construction must remain in the hands of the individual states primarily, since no two states have the same problems and turning the initiative over to Washington is unthinkable.

## Briefly Noted . . .

Urban expressway and the street planners today don't know whether they are creating a trend, accelerating it or merely following it in their long-range plans. We refer to the exodus of shoppers from downtown or central business districts of cities to the suburban or fringe areas. Community growth and along with it shopping volume in retail centers has grown faster in city suburbs than in the cities' hearts, notes a special report in "U. S. News & World Report."

Congestion and lack of parking space in downtown areas, plus difficulty in getting to and from such areas, coupled with the planning of retail centers to offer ample parking space in suburbs, are the principle reasons given by this survey. It reminds all concerned that the planning of highway transportation facilities in and around cities is not just a physical engineering problem but an economic and social problem, intimately tied in with business and community development.

**IT COSTS LESS TO BUILD GOOD ROADS THAN TO HAVE POOR ROADS**

# New Runway for Newark Airport

**Heavy-duty pavement, designed to resist subsidence, built on tidal marsh. Project included large-scale hydraulic filling and use of vertical sand drains throughout runway area to expedite stabilization. Accelerated traffic test on test section used to determine pavement design**

*A Roads and Streets Project Summary*

A new instrument runway was completed at Newark Airport recently which demonstrated once again that the engineer and contractor can conquer the tidal meadows along the New York water front. Located immediately adjacent to the New Jersey Turnpike, the new paving was built by methods similar to those used in constructing the Turnpike across the marshes. The runway surface is only 10½-ft. above datum.

Newark Airport, one of the Port of New York Authority's fields serving the New York area, has long been in need of modernization and expansion. A serious problem has been the uneven subsidence of pavement built on the deep mud of the low tidal land. An enlargement program has included repairs and strengthening of existing pavement and the addition of a new 7,000 x 200 ft. instrument runway, a parallel 100-ft. taxiway, connecting taxiways and warm-up pads, totaling 330,000 sq. yd. of new paving. The field extension occupies approximately 110 acres.

Construction estimated to cost $9,000,000 was begun in May, 1950, with the awarding of a contract for sand filling and vertical sand drains to Construction Aggregates Corporation, of Chicago, and Peter Kiewit Sons' Company, of Omaha, in joint venture. This contract amounting to $5,760,000 was taken in conjunction with similar work on the adjacent New Jersey Turnpike, the contractors dove-tailing operations for the two projects and utilizing the same equipment and organization.

The contract required the placement of 3,340,000 cu. yd. of sand by hydraulic methods, of which 2,500,000 was for the runway, taxiways and related new paving. The contract marked the beginning of a five-phase operation consisting of (1) initial sand filling to build a working platform over the marsh, (2) placement of vertical sand drains, (3) completion of filling including temporary surcharge designed to accelerate settlement, (4) removal of the surcharge and installation of culverts, and (5) construction of pavement and facilities for lighting and landing control.

The first problem was to effect settlement of the marsh to the point of stability, achieving this subsidence within the construction period. To this end a grid of vertical sand drains was designed to encompass the entire area of the new runway and other paving. This was the first over-all use of vertical sand drains for an airport. (Subsequently, however, a similar scheme was adopted for a somewhat smaller runway and taxiway area at the Norfolk Naval Station, which field was opened to traffic in August, 1952).

### Sand Platform

The initial step was to pump in sufficient sand for the working floor, a blanket 4 or 5 ft. thick being required. Sand for this and subsequent filling was brought in by two sea-going hopper dredges of 2,500 cu. yd. capacity each, with two additional dredges used during peak operation. Sand was obtained in Gravesend Bay, one mile off Coney Island near the Narrows. The dredges averaged 2½ round trips per 24-hour day with a 7-day work week. Sand was pumped by booster pumps to the site through 20-in. pipelines ranging from 1,000 to 10,000 ft. in length, sand being deposited in diked settling areas and spread with heavy dozers.

As the platform was completed, drilling began for the vertical sand drains.

These drains, totaling 570,000 lin. ft., were placed by methods and equipment similar to those used for the much-publicized New Jersey Turnpike where 5,800,000 lin. ft. of such drains were installed. This report will not go into the technique, except to note that it consists of the drilling of a grid of holes from 18 to 24 in. in diameter down through the layers of saturated unconsolidated soil to more stable strata; filling these holes with a porous sand; then building up horizontal layers of sand over the area at a controlled rate to accelerate settlement and squeeze out the ground water. A temporary overload or surcharge of 4 to 6 ft. of sand was required in the scheme, which was designed to achieve, in six months or so, a total settlement equal to that which might otherwise come about gradually over a period of years. During this briefer period water in the mud layers seeped along horizontal bed planes in the soil until it reached the vertical sand piles, where it then rose through the sand to the horizontal sand layer and escaped to one side. This method eventually brought about satisfactory stability.

The sand drains were installed by driving a plugged steel pipe mandrel into the ground for the specified depth by means of compressed-air driving leads designed especially for the purpose. The pipe was then withdrawn,

★ Placing sand subbase for large culvert under runway, Newark Airport

★ Sand filling and drainage for the new instrument runway can be seen in this excellent air view

during which time the hinged plug on the bottom end opened up, and sand was introduced into the pipe at the upper end, the result being to leave a column of sand in the hole after the mandrel was withdrawn. Four sand drain rigs were used.

### Perforated Drains

To tap the groundwater as it rose in the vertical sand columns, and hasten its conveyance to the outer ditches, drainage lines were installed consisting of approximately 40,000 lin. ft. of plain or perforated corrugated metal pipe of 6 or 8 in. diameter. This pipe was laid on top of the initial working platform and covered by succeeding sand layers. For the 7,000 ft. runway, two longitudinal lines of 6-in. drains were placed and connected with 8-in. cross-overs at 500 ft. intervals. One line of 6-in. pipe wsa used along the centerline of taxiways.

To insure against disruption of the drainage lines due to distortion under settlement as filling progressed, special 4-ft. sleeves were placed at joints every 20 ft. Discharge during the settling process emptied into open ditches for conveyance through culverts and via 36-in. corrugated metal drains with automatic flap gates, to a nearby creek.

Filling then progressed in three more layers, two being each about 4 ft. thick, the last lift of sand 6 to 8 ft. deep representing the surcharge. The first lift was placed to a width of about 500 ft. for the main runway, with succeeding lifts graduated to narrower widths, the surcharge lift being 260 ft. wide.

Sand was pumped through the 20-in. lines at the rate of about 1,000 cu. yd. per hour, the discharge running as high as 18 per cent solids. Pumped sand and water were delivered into areas confined by low dozer-built dikes. Bulldozers worked in the wet to complete the spreading and consolidation of sand as the water drained away to temporary outlet channels.

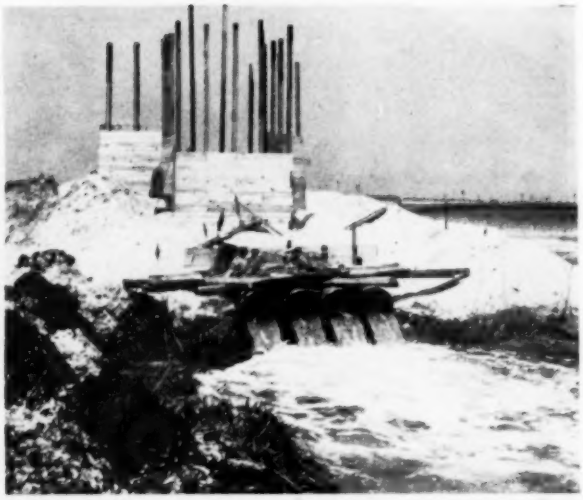
An overflow for the water was provided by a timber outlet structure at one point in the dike. The flow from this outlet to natural drainage channels was carried by a battery of 20-in. pipes. Systematic and prompt removal of water was considered a highly important phase of the work, since the chief purpose of the project was to eliminate ground water.

### Surcharge Removal

A contract was awarded late in 1951 to Union Building and Construction Corporation, of Passaic, for removal

★ Very large yardages of sand surcharge were removed with the help of this special extended dozer blade, mounted on an Allis-Chalmers HD-20 tractor

★ Sand was pumped into diked fill areas. Bulldozer seen working on dike



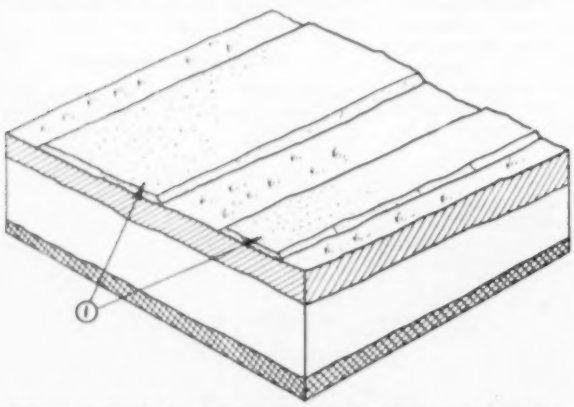
★ Showing temporary quadrupie 20-in. pipe installed to handle run-off during second-lift filling operation

★ Typical drain-installing equipment—Manitowoc crane with mandrel driving rig; Joy compressors at left; Bucyrus-Erie loader at right

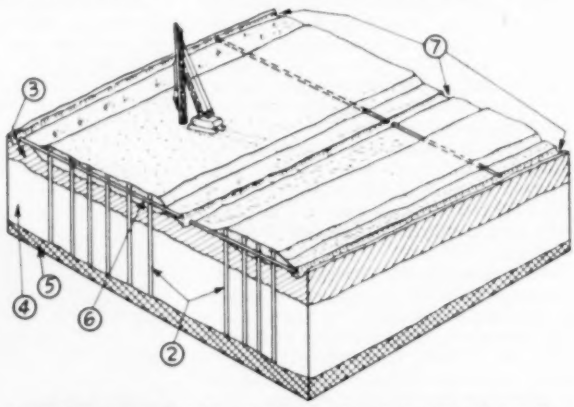
★ Details of the upper end of the sand drain mandrel, showing sand hopper and supporting lugs

and redepositing of some 820,000 cu. yd. of sand surcharge, and for placement of major drainage structures involving 100,000 cu. yd. of excavation. The scheme was to move the surcharge material laterally to a position where it would serve to widen and counterfort the fills along the shoulder edges.

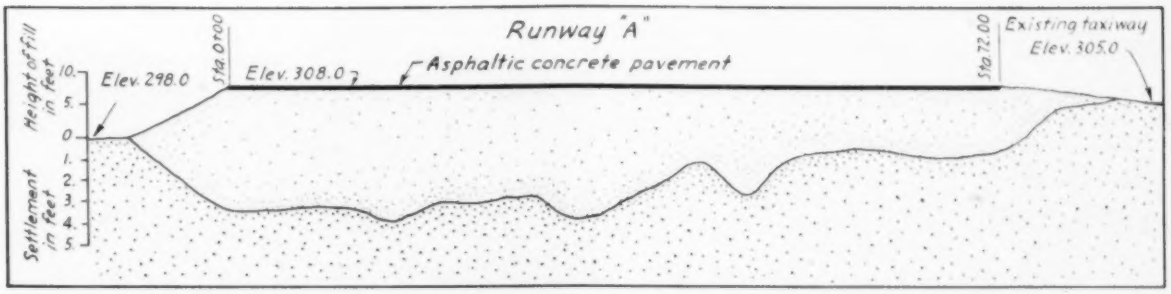
This stripping was accomplished at a high rate of speed, aided by the easy handling of the sand, by the massing of a large equipment fleet, and by special extra high, winged dozer aprons. The equipment worked




★ Stage 1. Specially selected porous sand fill (1) is placed on the area to be occupied by runway and taxiway




★ Stage 2. Vertical sand drains (2) are driven through sand fill (1) penetrating swamp peat (3), soft organic silt and clay (4), and into the firm strata (5) underneath. Porous drain pipes (6) installed in sand fill to collect water from sand drains. Ditches (7) installed with the drain pipes to collect and carry away flow




★ Cross-section of runway foundation showing settlement of sand blanket into the swamp

in a rotary pattern. Tractor-scraper teams comprised 16 Allis-Chalmers HD-20 tractors, 4 HD-15 tractors with Baker hydraulic bulldozers, and 3 Model 524, 3 Model 625 and 3 Model 620 Gar-Wood scrapers. The heavier HD-20's pulled the scrapers and the HD-15's spread the material. This equipment besides stripping away the surcharge sand also performed much of the finegrading, usually being able to work in conjunction with rolling to approach the specified tolerance of 1 in. above or below final grade.

General handling and clean-up work were performed by an Allis-Chalmers HD-20G Tracto-Shovel with 4-yd. bucket, and an HD-5G with 1-yd. bucket.

### Pavement Design

Because of the unusual conditions it was decided to build a test runway and subject it to accelerated traffic tests, as a means of determining the requirements for an adequate pavement design, and to decide on the construction methods. This section, built 30 ft. wide, was laid out in the form of a closed race track, 500 ft. by 200 ft. Ten test sections were included comprising different combinations and thicknesses of pavement layers. These ranged from a minimum pavement consisting of 7½ in. of limestone screenings, and a 2-in. top course to a maximum pavement comprising two 3-in. courses of crushed stone penetrated with asphalt, a 2-in. binder course, and a 1½-in. surface course of asphaltic concrete.

Traffic testing was done by means of a 100-ton pneumatic tired Supercompactor having two articulated steel ballast boxes supported on four tires on a single axle. For the test runs the unit was employed with the two inner tires deflated, throwing the entire weight on the two outer tires —100,000 lb. each. This arrangement simulated actual airplane wheel load concentrations, exceeding any anticipated loads. The compactor was pulled around the test track a total of more than 10,000 passages, during which test data were taken covering such items as temperature, vertical and laterial deflection, cracking, rutting and other essential data for correlation with construction data. The test runs were completed in a period of 40 days. The minimum pavement section showed rutting, cracks and depresssions at 2,500 passages. The maximum pavement stood up excellently after 10,000 passes.

As a result of these tests, an economic pavement design totaling 14½ in. thickness was adopted consisting of a 6-in. compacted subbase of limestone screenings, a 5-in. penetration macadam base, a 2-in. asphaltic concrete binder course, and a 1½-in. asphaltic concrete surface course. This pavement was placed during the 1952 season.

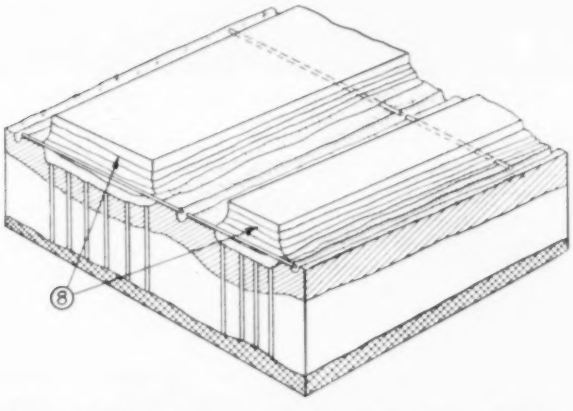
Stone screenings were required to be compacted to a field density of at least 95% of the maximum density at optimum water content, as determined by the modified AASHO standard laboratory method of tests.*

Aggregate for the penetrated crushed stone was required to conform to the New Jersey State highway requirements.† Stone for choking conformed to state highway requirements for 1½ inch sized stone. Asphalt cement of 100-120 penetration grade was used.

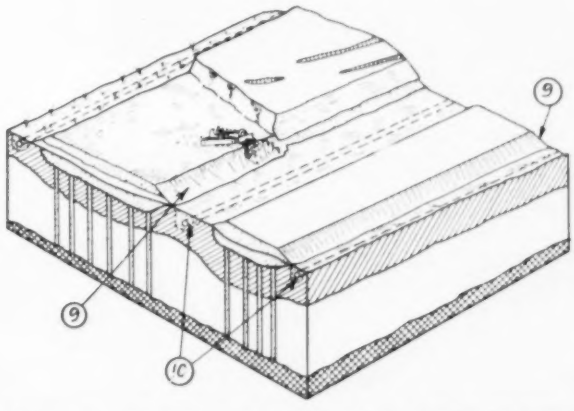
The Contractor was required to spread, using approved equipment, 1½ inch size broken stone in a uni-

*The specification: "The optimum water content and maximum density shall be determined in accordance with the Standard Laboratory Method of tests for the compaction and density of soil (AASHO designation: T 99-49) of the American Association of State Highway officials, with the following modification: (a) Weight of rammer or metal tamper shall be 10 pounds instead of 5½ pounds. (b) The tamper shall be dropped from a height of 18 inches above the sample instead of 12 inches. (c) The samples shall be compacted in five equal (approximately one inch) layers instead of three equal layers. The field density of the compacted screenings shall be determined from in-place density tests or from undisturbed samples cut out from the rolled subgrade."

†For "broken stone," Paragraph 3.13.2 "Material" of Section 13 "Miscellaneous Road Materials," "Standard Specifications, New Jersey State Highway Department," 1941.




★ Stage 3. Additional fill and surcharge load (8) is placed in layers within the areas of runways and taxiways. This causes consolidation of the swamp peat (3) and soft organic silt and clay (4) as the water is gradually squeezed out of these compressible strata




★ Stage 4. After consolidation has occurred in the underlying strata (4 to 6 months) the surcharge load is removed from the runway and taxiway area and placed at the sides to form shoulders (9). Permanent storm sewers (10) are then placed to take rain water run-off

★ Grading of sand fill in progress for taxiway. Caterpillar tractors and scrapers. Construction Aggregates Corporation, & Peter Kiewit Sons' Company joint contract

★ Showing how hydraulically placed sand was kept cleared from vicinity of filling pipe by means of buildozer working in the wet. Vertical pipe at right is connected with settlement plate

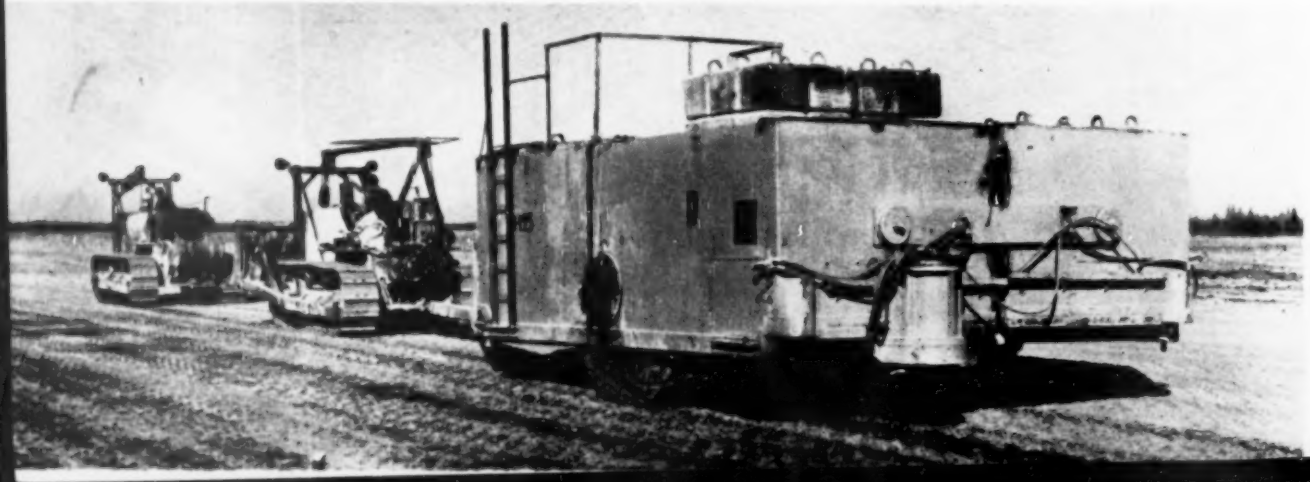
★ In this picture, surcharge removal is being handled by a pan and dozer combination assisted by a pusher

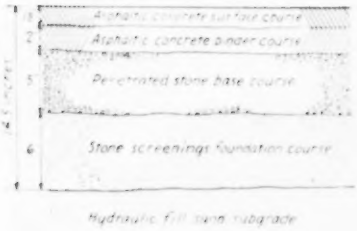
★ Every kind of equipment was pressed into service for removing the surcharge. Allis-Chalmers tracto-shovel used by Union Building and Construction Company

★ Depositing stone screenings for runway subbase

★ Screenings for runway subbase were fine-graded with a motor grader

★ The 100-ton Supercompactor being used to densify the sand fill through an overlying blanket of granular material




Asphalt concrete top course
Asphalt concrete binder course
Penetrated stone base course
Stone screenings foundation course
Hydraulic fill sand subgrade

★ Cross-section of runway pavement for Newark Airport

form layer over the stone screenings course, with due care being exercised to have minimum segregation of coarse and fine particles. The broken stone was rolled by a 3-wheel power roller weighing not less than 330 pounds per linear inch of tread of rear wheels. Rolling was specified to commence at the sides and proceed toward the center of the pavement, overlapping on successive rollings and continuing until "no further noticeable depression results from the rolling." Irregularities in the surface greater than one inch from a true plane were corrected and the surface rerolled.

Rolling was emphasized in specifications for the asphalt concrete binder course, which was required to be "rolled until all roller marks are eliminated, until the surface is of uniform texture and true to grade and cross section, and until the density of at least 92% of the theoretical density is obtained."

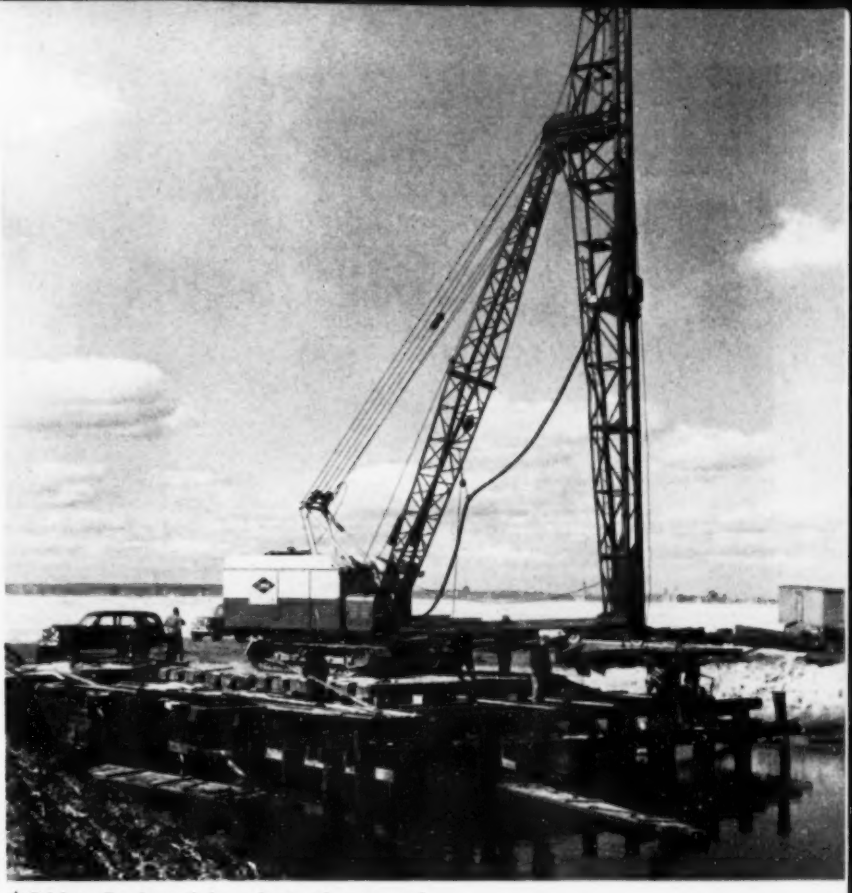
The asphalt concrete top course specifications were similar in all respects to the foregoing requirements for the binder course, except for combined aggregate degradation and asphaltic cement content, and except that the variation from a plain surface as measured by a 16-foot straight edge could not exceed ¼ inch.

### Notes on Super-Compactor

The unusual feature of a heavy layer of screenings was hit upon as a means of providing a satisfactory and economical subbase and at the same time confining the sand so that rolling could proceed effectively. The screenings were available economically from waste piles of the New York Trap-rock Corporation.

The heavy compactor, following its use on the test runway, continued to serve a major role beginning with deep compaction down through the 6-in. screening layer and into the sand fill. Weak spots thus detected in the subgrade and screening layer were corrected before the penetration base was placed.

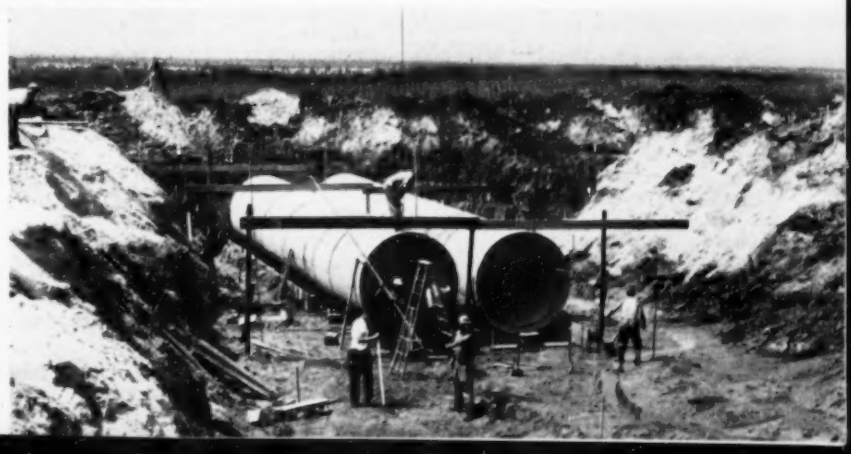
The compactor also served subsequently in conducting plate loading tests on the completed runway for evaluation purposes. For this use the compactor had attached to its back end a hydraulic pump for applying loads to a circular steel bearing plate placed on the pavement, the loaded



★ Driving piles for a timber culvert under runway A

★ Special large-capacity spreader box used to place stone for penetration base course. Union Building and Construction Corporation contract

★ Installing two 72-in. reinforced concrete culvert lines under a runway. Organic silt was removed and a 2 ft. granular blanket was placed beneath the pipe cradle, for which forms are here seen



★ Trenching in progress along the east side of the instrument runway, for installation of lighting duct lines

★ Asphalt penetration followed usual procedure, with large capacity equipment for the large gallonage required

★ Hot mix asphaltic concrete placement in progress on one of the new taxiways at Newark Airport

★ The finished runway, complete with latest type marking and lighting, designed for heavy traffic over unstable marshland

compactor serving as a reaction weight.

Standard procedures and equipment were used for the base and asphaltic pavement placement with a few exceptions. One innovation in equipment consisted of a special large-capacity stone spreader box which expedited placement of the coarse crushed stone for the penetration base course. This spreader, known as a Jersey Stone Spreader, was designed to permit a spread of sufficient depth of loose stone in a single pass to provide the 5-in. compacted layer.

### New Type Lighting

This runway is the first one on any commercial airport to have high intensity (25,000 candle power) runway lights every 100 feet. The usual spacing is 200 feet. In accordance with CAA standards, the runway lights are white, yellow and green; the taxiway lights are blue.

Center-line approach lights extend for 3,000 feet from the southerly, or instrument approach, end of the runway. This installation consists of 30 horizontal bars of light, each 14 feet wide, spaced 100 feet apart. Viewing these in perspective, the pilot sees a broad stripe of light leading to the center of the runway. In addition, lights in the center of each bar flash in sequence so that the pilot sees a "moving" light going down the center of the stripe towards the runway.

Instrument Landing System equipment (ILS) and Precision Approach Radar (PAR) are included. The approach lights, ILS, and PAR were installed by the CAA and required a total of 255 miles of single conductor wire.

The runway markings, which conform to the latest CAA specifications, include: solid stripes, each 3 feet wide, along the full length of each side of the runway; a dashed three-foot-wide center line; threshold markers at each end of the runway. Each marker consists of eight dashes, each 150 feet long and 12 feet wide; distance markers 500, 1,000, 1,500 and 2,000 feet from each end of the runway; numbers to designate the runway heading.

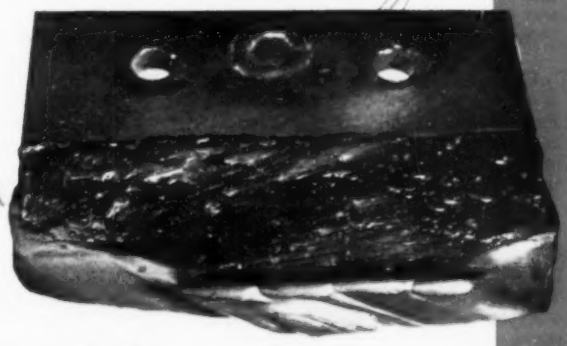
### Acknowledgments

The work here outlined is part of a program of financing, improvement and enlarged operation initiated in 1948 by the Port of New York Authority, for which $25,980,000 has been committed through September, 1952, without any cost to the general taxpayer since the Authority is self-supporting. The modernization project has been carried out under the direction of John M. Kyle, chief engineer for the Port of New York Authority, with H. G. Decanq in charge on the job. Porter-Urquhart Associates, of Newark, were special consultants on the sand drains.

Ezra Sansibar, vice president of Construction Aggregates Corporation, was in charge for the filling contractors, with Gilbert Rocke, chief engineer, Jim Williams, project engineer, and Peter Berzine, superintendent. Dow H. Drukker Jr., is president of Union Building and Construction Company, Thomas Knowles, superintendent.

**Ralph E. Spears** has been appointed District Engineer of the Salt Lake City office of the Portland Cement Association effective January 12, 1953, according to an announcement by Carl D. Franks, Association Executive Vice President. Mr. Spears succeeds E. B. Wilson, who resigned to enter business for himself in Oklahoma.

# Hard-Faced ASPHALT MIXER PADDLE Lasts 6 TIMES LONGER!



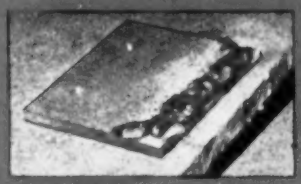
## STOODY ALLOYS
### save costly maintenance

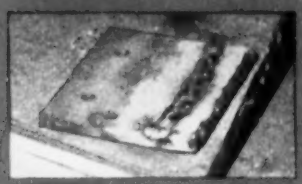
This combination of Cobalt Borium Inserts and Stoody Tube Borium produce the ultimate in abrasion resistance—*is truly a deluxe hard-facing treatment!* The hard-faced asphalt mixer paddles outwore conventional cast iron paddles by 6 times—*But even more important was the elimination of difficult changes, saving hours of costly downtime!*

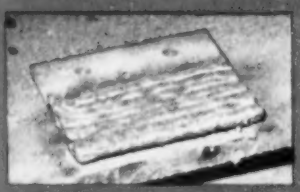
**For deluxe wear protection on all equipment ask your Stoody dealer. In most cities he's listed in the "yellow pages" of your Classified Telephone Directory—or write for dealer list.**

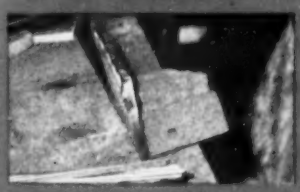
Tube Borium around edge and over inserts

### How it was done

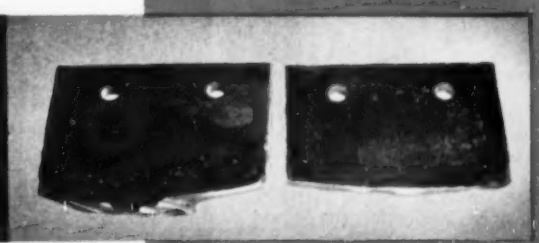

1. Cobalt Borium Inserts were positioned along lower edge of paddle on leading face and anchored firmly with a pass of mild steel.


2. Inserts were washed over with deposit of Stoody Tube Borium, reaching back approximately 1".


3. Balance of face was covered with cast iron.


4. A bead of Tube Borium around side and bottom edges completed the paddle.

## COMPARATIVE RESULTS



Hard-faced paddle after 6 weeks use.

Conventional cast iron paddle worn out in only 6 days.

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# Roads and Streets in the News

## Highway Departments Planning Bigger Programs in the Year Ahead

ON the heels of a record $5 billion expenditure for highways in 1952 at all government levels, another push into new high ground dollar-wise is foreseen in the plans of the state highway departments for 1953.

Five states are considering the launching of large toll road projects.

Despite new revenue sources beginning to be available in a few states, the prevailing problem is to keep abreast of traffic wear and obsolescence, with virtually every state fighting a losing battle. Legislative meetings this year in 44 states have road problems high on their agendas.

These are some of the chief threads of interest in year-end reports received from state highway departments. A few of the reports are presented herewith; data from additional states will be published in March Roads and Streets.

**Pennsylvania.** According to C. H. Buckius, Chief Engineer, Pennsylvania Department of Highways, the department expects to total $128 million expenditures for state highway construction and resurfacing on 2,300 miles in 1953. This compares with $120 million for about 2,000 miles in the past year. Revenues will not be gauged until the Legislature now in session has reviewed the situation.

The contract program for recent years, is as follows, believed to constitute a dollar volume record among state highway departments:

| Calendar Year | Amount of Contracts | Bidders per Contract |
|---|---|---|
| 1946 | $ 41,980,000 | 2.39 |
| 1947 | 71,282,000 | 2.89 |
| 1948 | 89,469,000 | 4.33 |
| 1949 | 65,277,000 | 6.38 |
| 1950 | 132,157,000 | 5.54 |
| 1951 | 67,645,000 | 3.83 |
| 1952 | 87,695,000 | 4.50 |

This state, which maintains 41,000 miles of highways down to town level, has a large maintenance force, and also carries an extensive day-labor construction force, said to be justified as a means of balancing the labor staff. An average of 10,921 employes maintained during the first ten months of 1952 is believed to be a record, in that it represents one employe to nearly four miles of road. The gradual reduction of employes due to mechanization is noted in the following:

| Year | Men Employed |
|---|---|
| 1952 | 10,755 |
| 1951 | 11,037 |
| 1950 | 12,234 |
| 1949 | 13,140 |
| 1948 | 13,114 |
| 1947 | 13,405 |
| 1946 | 14,247 |
| 1938 | (All time high) 62,872 |

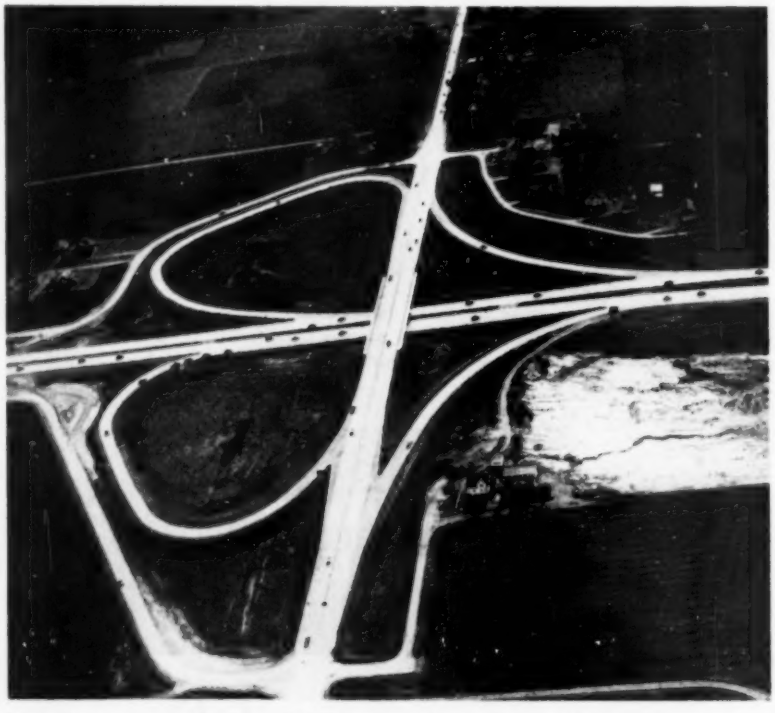
Recruiting of engineering employes is cited as a foremost problem by the Pennsylvania department. A serious cement shortage in 1952 was a problem, with steel tightness continuing to slow construction of bridges.

Among the year's points of progress, Mr. Buckius cited the adoption of a new procedure for expediting the payment of final and semi-final estimates to contractors.

A year-end report to the People of Pennsylvania, by E. L. Schmidt, Secretary of Highways, notes that steady improvement in highway service has resulted from the policy of increased and accelerated maintenance; resurfacing and widening; reconstruction of selected primary highways; and improvements of remaining earth roads on the state system. Commenting on the over-all problem, for which General Motors Corporation is currently offering prizes for a solution, he said that the only solution is for all to realize that additional funds must be provided for road improvement. Of the $201,000,000 (a record for any state) in sight in 1953 for road construction, maintenance and administration at all levels, only $90.5 million is available for reconstruction, reconstruction and resurfacing of primary roads, including federal aid.

**Texas.** Construction work started or awarded on the state system in 1952 reached over $105 million in 1952, as follows:

| | Miles | Amount |
|---|---|---|
| Grading and small structures, etc. | 215.83 | $ 5,495,600.00 |
| Asphaltic Surface | 3,051.75 | 67,530,629.20 |
| Concrete Pavement | 118.13 | 12,682,626.10 |
| Tunnel Construction | ——— | 3,973,000.00 |
| Miscelaneous | 24.26 | 556,922.85 |
| Bridges, Underpasses and Overpasses | | 15,284,313.43 |
| | 3,409.97 | $105,523,091.58 |



★ An air view of the grade separation at Calumet Expressway and 159th Street, entering Chicago. One of a number of such separations which permit safe, uninterrupted travel along the superhighway bypassing the congested industrial south side. (United Press)

The mileage figures, according to Fred T. Bennett, Engineer of Traffic Services, denote initial improvement on unimproved highways, and improved highways which received additional improvement, but not such items as sealing, retread, etc.

The 1953 program will likely total $125,000,000 for 4,000 miles through present revenue sources. The subject of increased revenues will be of primary concern to the Texas legislature, convening in January.

"Perhaps the most outstanding trend in highway needs," notes Bennett, "is the noteworthy interest of the Texas public in additional highway revenue as an answer to traffic problems between our major urban areas. The 50-mile urban expressway system constructed by this department and now open in five of our major cities has met with a great deal of popularity. We also take some pride in the Farm-To-Market Road network built primarily since World War II—over 21,000 miles of which is now constructed or financed for construction."

**Michigan.** Charles M. Ziegler, State Highway Commissioner, reports that contract awards for construction on state trunkline roads in 1952 totaled some $40 million, compared with $22 million in 1951 and $25 million in 1950. During the year about $10 million of the Detroit expressway bond issue was obligated for construction work or right of way purchase, in addition to the above sum. A 2.4 mile section of the John Lodge expressway in Detroit was opened recently (Roads and Streets, Jan. '53).

The 1952 state road program included awards for 56 major structures; 82 miles of p.c. concrete pavement, including 13 miles of 4-lane; completion of 434 miles of bituminous concrete resurface on old pavement; 206 miles of bituminous aggregate surfaces on gravel roads; graveling of 38 miles; stabilized aggregate placement on 400 miles of gravel roads and on 89 miles in preparation for new surfacing; grading and drainage of 49 miles.

High in the year's news was the approval by the State Administrative Board of a $20 million bond issue to help finance the Detroit-Toledo expressway. Bonds will be supported by state and local tax sources and federal-aid, with the city of Monroe a party in the contract. Completion date is set for 1955.

A bond-financed expressway in Grand Rapids is contemplated, with bond financing for all purposes on the state trunkline system expected to total $25 to $30 million in 1953.

**Illinois.** According to Frank N. Barker, Chief Highway Engineer, the Illinois Division of Highways entered into new contractual obligations during 1952 involving the expenditure of approximately $96,100,000. 1953 state road construction will total an estimated $126,000,000 including $70,000,000 carried over; details as given in the accompanying table.

| Type of Construction | Unit | Work Completed During 1952 (Estimated) | Carried Over to 1953 (Estimated) |
|---|---|---|---|
| Portland cement concrete pavement | miles | 94 | 45 |
| Bituminous concrete surface on gravel or crushed stone base | miles | 0 | 7 |
| Bituminous concrete surfacing on existing rigid-type pavements[1] | miles | 765[2] | 244 |
| Low-type bituminous surfaces on new gravel, crushed stone or soil cement bases | miles | 29 | 39 |
| Low-type bituminous surfaces on existing flexible bases | miles | 356 | 152 |
| Untreated gravel or crushed stone surfaces | miles | 82 | 35 |
| Earth grading (separate contracts) | miles | 23 | 5 |
| New bridges | number | 47 | 59 |
| Bridges to be widened | number | 21 | 18 |
| Bridges to be repaired | number | 9 | 6 |
| Highway grade separations | number | 1 | 4 |
| Railroad grade separations | number | 3 | 6 |

[1] Old two-lane rural pavements are usually widened with concrete to either 22 ft. or 24 ft. prior to surfacing with bituminous concrete.

[2] Includes about 124 miles of 1½ and 2-in. surfacing which is the first stage of two-stage construction.

"In Illinois," notes Mr. Barker, "A noticeable and increasing trend is the sentiment being expressed by municipalities against the congestion, noise and vibration stemming from the operation of trucks of the heavier types within and adjacent to municipalities. The relocations of existing main truck routes over new locations to improve traffic service—particularly through residential areas—are becoming increasingly difficult, and in some cases almost impossible of accomplishment because of the concerted opposition of residents and property owners along the lines of the selected locations.

"While it may be beyond the realm of possibilities to bring truck operation to a par with the automobile, improvements in the manufacture, maintenance and operation of trucks might conceivably result in an appreciable reduction in noises and other annoyances which are the basis of complaints against the establishment of truck routes through urban areas."

**North Dakota.** Data reported by M. P. Wynkoop, Chief Engineer, N. D. State Highway Department. An important event of 1952 was the completion of state-wide engineering and financial studies, as authorized by the Legislature through the Legislative Research Committee. This committee engaged the Automotive Safety Foundation, Washington, D. C., to make the engineer study; and Dr. James C. Nelson, Economic Consultant and Professor of Economics, Washington State College, to make the financial study. Based on these data, the Committee has made recommendations to the Legislature which convened early in January.

During 1952 the state highway department completed $11,156,000 in work, which included 338 miles of grading and incidental, 145 miles of base and asphaltic concrete surfacing, 6 miles of p.c. concrete and 543 miles

## Bazley heads Pennsylvania Constructors for '53

J. Robert Bazley, president of J. Robert Bazley, Inc., Pottsville, Pa., was elected president of the Associated Pennsylvania Constructors, state-wide organization of Pennsylvania's highway and heavy construction industry, at the Association's thirty-first annual convention. Mr. Bazley has served two years as vice-president of the group. He succeeds William O. Faylor, President of the Middlecreek Construction Company, Middleburg, Pennsylvania, who has become chairman of the Association's advisory board.

J. Robert Bazley

Bazley's firm conducts a large road building and coal stripping operation. On two occasions the British government called him to England to advise on coal mining operations. He is on several committees of the American Mining Congress, and will be a director of the Contractors' Division of the American Road Builders Association.

Named to his 18th term as executive secretary is A. E. O'Brien of Harrisburg, Pa.

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of gravel surfacing. State aid program included an additional $355,700 for graveling, re-sealing, grading and structures, totaling 56 miles. The federal-aid county feeder system also received $4,441,000 for items totaling 550 miles.

**Georgia.** This state in 1953 will begin to enjoy more rapid construction of needed highways, as a result of a state constitutional amendment passed in November, ending the heretofore large diversion of road funds.

According to Roy A. Flynt, State Highway Planning Engineer, state highway construction awards for the first eleven months of 1952 aggregated $23,001,000 for 1,057 miles of state and $13,922,000 for 1,186 miles of country roads, or $36,923,000 total. The 1953 program is estimated at $45,000,000.

**Ohio.** S. O. Linzell, Highway Director, reports:

"During the past year 637 miles of construction was awarded or under construction, at a cost of nearly $37 million. The figure includes 58 major bridges.

"Estimates for 1953 are difficult at this time since the requirements imposed by the Turnpike across Northern Ohio and by the Atomic Energy Plant being built in Pike County will affect our construction program somewhat, depending on what funds we are able to procure.

"The Highway Department will have available $6.5 million of State highway funds in the first six months of the new calendar year, and an added $10 million in the last half of the year. This, with federal aid funds that can be matched, and lesser amounts from other sources, would lead to a construction program not to exceed $49 million.

"That $49 million program would be our total maximum contract construction program. It is just impossible to stretch this program to cover our critical highway deficiency plus the obligation incurred by the Turnpike and improvements for the Atomic Energy Plant."

The Ohio Legislature, which has just convened, is expected to consider increases in gasoline tax and license revenue.

*(Editor's Note: Reports from additional states will be given in March Roads and Streets.)*

## Hoover heads Missouri AGC

Robert M. Hoover, president of Kansas City Bridge Company, Kansas City, Mo., was elected president of the Associated General Contractors of Missouri for 1953, at the 27th Annual Convention, Kansas City, January 7-8.

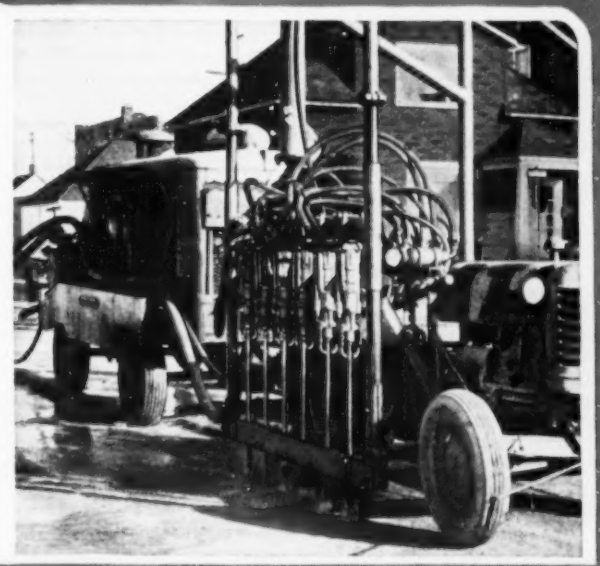
H. W. Masters, president of Masters-Jackson Paving Co., Springfield, Mo., was elected vice-president; and E. W. Menefee, president of W. J. Menefee Construction Co., Sedalia, Mo., was elected treasurer.

GM DIESEL
CASE HISTORY No. 5211-4

**USER**: R.L. Coolsaet Construction Co., Dearborn, Mich.

**INSTALLATION**: GM Diesel-powered Ingersoll-Rand 600 cfm rotary compressor replacing a 500 cfm compressor, supplies air to a tractor-mounted multiple drill—six drills 12" apart.

**PERFORMANCE**: Previous Diesel compressor supplied 75 lbs. of air to each drill and took time to build up pressure after each move. GM-powered compressor supplies steady 95 lbs., starts drills immediately and saves 20% in fuel costs. Unit drills 600 lineal ft. per day.



# NEW GM DIESEL-POWERED RIG CUTS PAVEMENT-BREAKING TIME IN HALF

R. L. Coolsaet figures his pavement-breaking time is cut right in half with this rig when compared to the old way with one man on each drill. Now he drills six holes at once—gets twelve holes drilled in six feet and moves up for the next series, all in three minutes, and one operator handles the job.

This is another good example of how General Motors Diesel-powered equipment gets work done faster and reduces costs at the same time. Two-cycle operation delivers a smoother, steadier flow of power—gives instant response to overcome sudden load changes. Simple design makes it easier to maintain—lower-cost parts make it cheaper to maintain. Add it up and you'll see why GM Diesels give you power at the lowest cost per horsepower hour—for *any* job.

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# Highway Research in Review

*Condensed from the preliminary report of Chairman Baldock, as given at the Highway Research Board annual meeting, Washington, D. C., January 13-16, 1953. This report briefly reviews 1952 accomplishments and explores some of the 1953 objectives.*

**By R. H. Baldock**

Chairman, Highway Research Board
and State Highway Engineer of Oregon

## Design

THE ferreting out of the blind spots in the design engineer's catalog of facts and throwing light on these dark places are the main functions of the Department of Design of the Highway Research Board. Effective research in geometric design requires close cooperation with other departments which have an interest in planning, traffic and safety.

**Problems Clarified.** Illustrative of this need for cooperative effort is the fact that the Committee on Geometric Highway Design has taken time to restate and rewrite twenty-six different research problems in order to make them more understandable to researchers and students in the allied fields of planning, traffic and highway safety.

**Medians.** At the meeting two years ago, the Committee on Geometric Highway Design sponsored a symposium on divided highways with narrow medians. Seven states participated and the results were published in Bulletin 35. This year the same committee will consider a report on median study for 1952 contributed by the State of California.

**Flexible Pavement.** Important new research on flexible pavement types has been sponsored by the Department of Transport, Canada. New data have been secured in Minnesota by the plate bearing tests and in Connecticut by a study of macadam base. Some further development on the nonrigid pavement research has been made at Hybla Valley in Virginia and some new experiments in Indiana using designs suggested by the Asphalt Institute.

**Concrete Pavement.** Active studies on concrete pavement design are under way, including comparison of several designs of slabs subjected to dynamic testing in Michigan; a continuation of studies on experimental pavements in Indiana; and observation of factors influencing pumping and the experimental use of sawed contraction joints is going on in several states.

**Bridge** design research has recently taken a very prominent position in the Board's activities. Last year the Bridge Committee sponsored papers that required two full sessions.

One of the major projects sponsored by the Bridge Committee during the past year has been the investigation of wind forces on bridges. This project involved an extensive test program in the wind tunnel of the Navy Aeronautical Laboratories, David Taylor Model Basin. The objective of the project is to gather basic data on which a logical specification for both transverse and longitudinal wind forces on bridge structures can be based.

The project is of particular importance as it is the first structural research project to be undertaken by a group of states cooperating in the financing, with work done under the direction of the Highway Research Board. Sixteen states, the Territory of Hawaii and the Disrict of Columbia are cooperating. The project establishes a precedent whereby a group of states can pool their resources for the solution of structural problems too large and too expensive for one state alone. This project is described in a paper presented at this meeting by George S. Vincent.

Investigations of the distribution of live-load stresses in bridge floor systems produced five good research reports last year and more are in the offing. Outstanding in this work are the researches at the University of Illinois, where most of the tests for composite action between steel girders and concrete deck have been made.

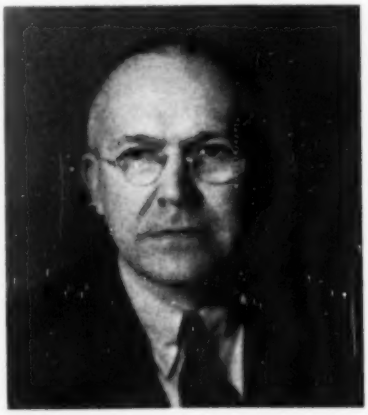
Interest in developments in prestressed and precast concrete construction is increasing. A great many states have at least one bridge project in which prestressing is employed. In a trip to Europe last year, I found that many of the concrete structures in Europe are prestressed, and am of the opinion that we of America have lagged somewhat behind the procession in this regard.

**Drainage.** Researches on the design of highway drainage facilities, such as bridges, culverts, storm drains, open channels, have been sponsored and reported through the Board's Committee on Surface Drainage.

An important investigation has been jointly sponsored by the Bridge Committee and by the Surface Drainage Committee. This has to do with the development of an inlet which would give maximum capacities for box culverts on steep grades. Several different types of inlets were investigated in a model study conducted as a cooperative agreement between the Bureau of Public Roads and the Oregon State Highway Commission, the work being done by the engineering staff of the Oregon State College.

## H. S. Fairbank Receives Honor

Herbert S. Fairbank, deputy commissioner, U. S. Bureau of Public Roads, was awarded the Roy W. Crum Award for Distinguished Service during the recent meeting of the Highway Research Board in Washington. The award is presented annually in recognition of "outstanding achievement in the field of highway research."



H. S. Fairbank

Mr. Fairbank has been deputy commissioner in charge of all research for the Bureau of Public Roads since 1943. He has directed a large research program independently and in cooperation with state highway departments and universities. He has been active in the work of the Highway Research Board since 1934 and is currently serving as chairman of its Department of Economics, Finance and Administration and of the Highway Research Board Committee on Economics of Motor Vehicle Size and Weight.

Fairbank is a native of Baltimore, Maryland. He was graduated from Cornell University in 1910, and except for a few months following graduation and military service in World War I, his entire professional career has been with the Bureau of Public Roads. His interest has centered on economic and physical research necessary to sound highway planning and convincing exposition of the facts developed.

An inlet treatment of very simple design has been developed which gives promise of practically doubling the capacity of concrete box culverts on steep grades when flowing under a head at a comparatively low cost. The investigation is presented at this meeting by Roy H. Shoemaker, Jr., Assistant Professor of Civil Engineering, Oregon State College.

### Traffic and Operations

**Speed Characteristics.** The Committee on Speed Characteristics has been formulating a research program and sponsors a paper on "Speed Characteristics on Vertical Curves" for this meeting.

**Vehicle Characteristics.** The Committee on Vehicle Characteristics has made their devices for measuring speed, gasoline, braking and throttle opening available to interested highway departments this year. West Virginia has used the instruments in determining the speed characteristics of highway routes which will compete with the toll road now being built. The Bureau of Public Roads has made extensive use of the equipment in measuring operating characteristics on the Pennsylvania Turnpike and parallel US routes, the Shirley Highway and alternate routes, the Columbia Pike before and after signalization, the Maine Turnpike and parallel US 1, the New Jersey Turnpike and parallel US 1.

**Urban Speeds.** The Committee on Operating Speeds in Urban Areas has prepared a progress report dealing with the accuracy of measuring operating speeds.

**Channelization.** The Committee on Channelization has completed its report (published in August). Fifty-nine examples of intersectional treatment were included. This Committee is sponsoring an open committee meeting this session. A demonstration of small scale models of vehicles and their use in channelization design will be given.

### Materials and Construction

**Bituminous Mixtures.** With reference to materials and construction, the Committee on Design of Bituminous Paving Mixtures is preparing a report on "Fundamentals Governing the Design of Bituminous Paving Mixtures." Comparative tests are continuing between several laboratories to compare density, stability and asphalt content with field behavior. Density and stability information is being obtained from state highway departments and other agencies constructing bituminous surfaces. Field experiments with the addition of rubber in bituminous mixes are in progress in the states of Arkansas, Florida, Connecticut, Georgia, Maryland, Louisiana, Missouri, New York, Ohio, Texas, Virginia, Wisconsin and the District of Columbia.

**Concrete.** Studies continue on the measure of internal strain in concrete pavement and the effects of curing on the resistance of concrete to spalling; also, the comparison of rates of freezing and thawing as affects durability.

The Committee on Dynamic Test of Concrete has about completed a handbook on the subject for publication.

Air-entrained concrete is currently being investigated for volume change, absorption, permeability, elastic properties, plastic flow, shrinkage between fresh and hardened state, study of fatigue and resistance to wear.

**De-Icing Chemicals.** The effects of chemicals used for ice control on pavements are under study in several states.

**Marking Paints.** Formulation and field evaluation of center-line marking paints with and without glass beads continues to be an important study in many states.

**Welding** of steel structures, both in shop fabrication and in the field, is becoming more prevalent. A Committee on Metals and Welding is studying new developments in welding techniques and is making progress toward the publishing of a manual for field use by welding inspectors.

### Soils Investigations

**Evaluation.** More and more attention is being given to attain a better evaluation of the quality of soils and its application to design in highway pavements. There has been continued development of test equipment and methods to evaluate the load-carrying properties of soils, with emphasis placed perhaps more on the triaxial type of tests than others. There have also been more investigations of the performance of pavements and their foundations under traffic in an effort to relate test results with environmental conditions.

**Frost Action** and its effect on highway and airfield subgrades continues to receive much attention.

**Lab Techniques.** There has been increased activity in the development of technique for laboratory testing of soils. Considerable emphasis has been given to consolidation and shear-testing measurements of pore pressures in soils. Laboratory preparation of specimens with special reference to compacting equipment and methods and their influence on the stress-strain characteristics have been subjected to more than usual inquiry.

### Economics, Finance, Taxation

**Vehicle Weight.** The Committee on Economics of Motor Vehicle Size and Weight has outlined five phases of their problem. Phase I, dealing with "Time and Gasoline Consumption in Motor Truck Operation," has been completed and published in Highway Research Report No. 9-A. Phase II deals with "Trends in Size and Use of Highway Freight Vehicles." Phase III is a study of "Truck Operation Costs." In connection with this phase, preliminary forms have been prepared for analyzing truck operations and statistics, which forms are being used in a study being conducted by the Washington State Highway Department.

Phase IV deals with the "Cost of Providing Highways to Carry Different Loadings." It is expected that the road tests now under way and those planned by the American Association of State Highway Officials and associated highway groups will provide pertinent data for this phase.

Phase V will deal with the integration of the first four phases and will specifically seek to determine the relationship of standards of highway design to vehicle size and weight. The increase in pay load and corresponding decrease in unit cost of vehicle operation must be balanced by the increased costs of providing highway facilities that are adequate in structural and geometric design, to determine proper size and weight limitations. This is based upon the assumption that the tax responsibility of the various weight and size groups be based upon the cost of the highway facility required for them, which would appear to be a reasonable approach to this problem.

**Finance and Taxation.** The Committee on Highway Taxation and Fi-

## High Cost of Equipment Delays

Fred B. Farrell, Chief, Highway Cost Section, Bureau of Public Roads, gave a paper "Some Equipment Management Problems on Highway Construction Jobs," in which the series of job-analysis studies made on 140 road jobs recently was reviewed. Composite figures for all jobs, encompassing grading, paving, etc., showed that the "key" equipment units were engaged in actual productive work an average of only 58 per cent of the total available working time, excluding weather delays. The key units are shovels, scrapers, pavers, etc., around which the pace of the job centers.

The remaining 42 per cent of the job time was lost in various kinds of delays (interruptions of the job cycle), nearly half of which were "minor" delays of less than 15 minutes each. The five best-run jobs, grouped together, averaged far less delay than the five poorest-run jobs from a "keeping-going" standpoint.

nance Handbook of 19 chapters is being written and it is expected that it will be completed in the year 1953. A Study of Vehicular Charges on Highway Toll Facilities has been made and will be reported at this meeting. Procedures are being developed for an Incremental Solution of the Motor Vehicle Tax-allocation Problem. The Committee is also sponsoring a paper at this meeting, titled "The Ohio Incremental Study." Two other studies have been completed by the Committee and are to be reported at this meeting. One deals with the relative taxation of diesel—and gasoline-powered vehicles, and the other reports on taxation of selected vehicles.

**Administration.** Five states have had studies made for the purpose of modernizing their organization structure. Another administrative study (in intergovernmental relations) has been accomplished by the Highway Research Board in Maryland. The purpose of the study was to determine principles and cooperative procedures which underlie the establishment of close cooperative and mutually beneficial relationships between all of the agencies in a state which are responsible for the administration of highways and streets.

A growing interest by state highway departments in in-service training has caused the Department to sponsor a paper on "In-service Training of Highway Department Personnel."

A committee is being formed to write a "Model Code on Highway Administration." This would provide a pattern for modernization of highway legislation relating to administration. A paper will be presented at this meeting, titled "Underlying Principles in Modernization of Highway Laws."

In this connection, Thos. H. MacDonald, Commissioner of Public Roads, in an address before the Centennial Meeting of the American Society of Civil Engineers, called attention to the fact that while we are progressing satisfactorily in the science of highway engineering we are deficient in the art, and it is in this field that the highway engineer must exert a more determined leadership.*

### Road Tests

**Maryland.** Early in 1950 the American Association of State Highway Officials formulated plans for a series of accelerated traffic loading tests on highways. The first purpose was to determine the effect of specific axle loads frequently applied at known speeds on respective pavements. The Maryland Project Road Test, One-M-D, involving an existing concrete pavement, had already been planned by the Interregional Council on Highway Transportation to determine the relative effects of 18,000- and 20,400-lb. single-axle trucks and 32,000- and 44,000-lb. tandem-axle trucks on reinforced concrete pavement. This test was successfully completed and the Highway Research Board's Special Report 4 on Road Test One-M-D, Publication 227, is a classic which represents the best test of this kind yet made. The findings and conclusions that can be drawn from the data secured are far-reaching.

**Idaho.** The Western Association of State Highway Officials then developed a test road in the Western Region. This work is also being carried on by the Highway Research Board and is the second of the large-scale research projects in a series designed to help solve the truck-weight pavement design problem. Ten western states, the Bureau of Public Roads, vehicle manufacturers, the petroleum industry and other agencies are cooperating. Supervision has been assigned to the Board because of its reputation as an unbiased, independent fact-finding organization. The cost of the project is estimated at $550,000. The ten states have contributed $285,000, which will cover the test facility and part of the test. The Bureau of Public Roads is furnishing certain equipment, material and personnel. The truck and truck-trailer manufacturers are contributing tractors, truck-trailers, and the petroleum industry will contribute the gas, lubricating oil and grease.

The test road (US 191 near Malad, Idaho) when completed will be incorporated in the Idaho highway system.

Regular traffic under full test loads was started on November 6. The operations were suspended for the winter on November 27. Not enough time has elapsed to make any definite reports. Next spring the Advisory Committee will determine whether to carry on the tests through the spring breakup, or whether to wait and carry on summer tests and make the final test the following spring when the frost leaves the ground.

### New Test Planned

The Highway Transport Committee of the American Association of State Highway Officials had recommended a comprehensive test to be carried on in the State of Illinois, nationwide in scope and calling for the construction of a new test road including both rigid and flexible pavements. There is evidence of support for such a road test of expanded scope with both industry and government cooperation.

The Highway Transport Committee referred its report to the Executive Committee of the AASHO at the Kansis City meeting. President Tallamy appointed a special commtitee to appraise the situation before calling a meeting of the Chief Administrative Officials of the several states to consider this great project, estimated to cost between four and six million dollars. It is certain that whole-hearted support by both industrial and governmental agencies is required before the project can be started. Tentative plans for the tests call for a series of sections to be built as a four-lane divided highway, all on fill made of one soil type. The pavement on each will be 24 feet wide, providing separate 12-foot test lanes for the different axle loadings. Sections of both rigid pavement and flexible pavement will be used. Tentative plans call for axle loads as follows: single axle 16,000, 18,000, 22,400 and 30,000; tandem-axle groups 28,000, 32,000, 40,000 and 50,000. Observers trained on the Maryland and WASHO test roads will record evidences of physical damage to the tested pavement structures.

### Leadership Challenge

Perhaps the most important task of the Highway Research Board since its inception has been the assumption of the job of fact-finding in the test roads studies. The Maryland study has been documented by a motion picture which tells the story so that a layman can graps the essential results. The WASHO test is now under way, while in the offing is a proposal for a most interesting road test in the State of Illinois. It is my opinion that no other agency is so well qualified as the Highway Research Board to do this job which is so important, since we now stand on the threshold of a new era in modern road building.

## Virginia road builders warned on wage and salary plans

Wage and salary controls expire, under the present law, on April 30, 1953, notes a bulletin to members from the Virginia Road Builders Association, which counseled as follows:

"At the present time there is no indication that these will be extended or reenacted in the immediate future. It is well for all of us to remember, however, that any change in the international situation or extension of the Korean war is sure to bring these back in force."

For this reason, firm members were urged to:

(a) Save all records covering pay adjustments, wage and salary schedules and documentation of job classifications.

(b) Save all correspondence, if any, with the Stabilization Agencies, especially approvals.

(c) For files keep a written explanation of all wage and salary policies in effect during the present period of stabilization. Under this heading consider (1) merit and length of service increases; (2) hiring practice; (3) promotions and transfers; (4) cost of living increases; (5) general increases, etc.; (6) bonuses and profit sharing plans.

*Published in Roads and Streets, October, 1952; pp. 50-51.

# Highway Research Board Broadens Program

**Excerpts from a few of the 150 technical papers and discussion topics, covered at the Highway Research Board Annual Meeting, Washington, D. C., January 13-16, 1953**

*(See Also Pages 62 to 64)*

THE recent annual meeting of the Highway Research Board, held in Washington, marked a continuance of a program of enlargement and broadening out, as well as of correlation, of American highway research. Long since gone is the day when soils, materials and other physical research were the chief areas of effort of the highway investigator. While studies toward better roadbeds are pushed with even greater intensity and specialization, the Board's work now takes in many selected committee assignments in the fields of need-measurement, finance, administration and economics; in traffic planning, control and accident prevention; in roadside and other phases of design; in specialized aspects of construction specifications; and most recently—in the broader aspects of truck transportation.

The Board's program is highlighted in this issue by Chairman Baldock's annual review. To be published in March is the beginning of a program to develop fundamental data on the economics of truck transport in relation to highway planning and financing.

A few selected meeting papers are briefly covered in the following paragraphs.

**Soils Engineering.** "The Development and Application of Soil Engineering in Michigan," by Olaf L. Stokstad, Michigan State Highway Department. This paper describes the systematic development of soil classification maps and other data, as an aid in better highway design, construction and maintenance. An extensive research program has aimed at learning the relationship between pavement behavior and the various soil profiles as identified and mapped.

In Michigan, soils engineering is considered a service function, wherein the soils engineer investigates, analyzes, reports and recommends, but leaves action to the design engineer, the construction engineer, and other interested groups. Soil classification is emphasized as the most important tool in the soil engineering kit. The paper summarized elements of detailed precedure.

(In this connection, a new edition of the Michigan "Field Manual of Soil Engineering," 360 pp., dated August, 1952, has been issued; price $4.50, remitted to Michigan State Highway Department, Lansing.—Editors.)

**Personnel Training.** In a paper, "In-Service Training of Highway Department Personnel," Robley Winfrey, Bureau of Public Roads, outlined the importance of better organized training of highway engineers, as a means of developing better engineers and of increasing productivity per man in these times of engineer shortage.

Training programs, which should continue throughout the worker's career, replace hit-and-miss methods of learning. They should include any or all of such phases as orientation, indoctrination, administration, communication, personnel relations, current operations, public relations, general technical, specific technical, and manipulative skills.

Seven state highway departments now have definite programs for old and new employes; four hold short conferences; five have a definite job-rotation program; six are currently developing a program; and 27 departments have no formal program and only informal job-rotation. The Bureau of Public Roads program, begun in 1946, has brought 172 college graduate appointments, of whom 62 completed the 3-year program, 20 are on leave, 70 are still in training, and 20 resigned during the program. Only one man who completed the program has since resigned.

**Bridge Maintenance.** A paper on California highway bridge upkeep methods, given by T. W. Rogers, Bridge Maintenance Engineer, California Division of Highways, outlined the organization procedure and the types of maintenance and repair problems most commonly encountered. In a $1 million annual program, the emphasis is on systematizing the inspection and working toward replacement of structurally critical bridges on a 5-year planning basis.

**Pavement Undersealing.** The Illinois Division of Highways, which has undersealed a very large mileage of old concrete pavements, made an investigation of materials, methods and results, with view of achieving a more durable and economical seal. The study was reported by W. E. Chastain, Sr., and John E. Burke, of the Division's bureau of research and planning.

Illinois practice has included use of a material meeting Grade A Oil Asphalt Filler AASHO Designation: M 18-42A except that minimum limit for ductility at 77° F. has been set at 3.0 cm. instead of 4.0 cm. This material has been considered generally satisfactory, as have the application procedures. However, there has been some evidence of brittleness and cracking at low temperatures, which destroys its intended functions as a flexible barrier against pumping of subgrade fines under heavy traffic and a seal against water reaching the subgrade.

No. 0 Korite material was used in the experiments, as was the above material, and also a special untried material of good low-temperature ductility.

The study looked into the economic limit of the thickness of the underseal, and other factors, on a highway section selected for the test. Best results were obtained when pavement joints were first surface-sealed and the eroded holes at edge "blowout" locations filled with dirt and tamped. Underseal holes drilled 5 ft. from the centerline on 12-ft. lanes proved best; holes nearer the edge resulted in more blowouts of bituminous material at the slab edge. Observations of results are to continue. The present report should be read in detail by the student of this subject.

**Air-Entrained Concrete.** The service record of pavements in the Northeastern states built with air-entrained concrete in the past 14 years was reviewed by L. E. Andrews, Regional Highway Engineer, Portland Cement Association. Mr. Andrew's paper summarized the findings of a walking survey in which detailed data were taken carefully charted, and correlated for 14 test road sections. The study covered such items as extent of scaling, cracking and progressive distintegration, if any; extent of grades, cut and

## Illinois Freeway Act Upheld by Court

*The Illinois Supreme Court on January 22 upheld the Illinois Freeway Act, which allows the state to determine places of access and enforce limited access on arterial highways designated as freeways. Previously a lower court had thrown out a request by the department of public works for condemnation proceedings. The Act will enable Illinois engineers to continue with plans for modern inter-city expressways, unencumbered by accident-breeding "shoe string" developments near cities.*

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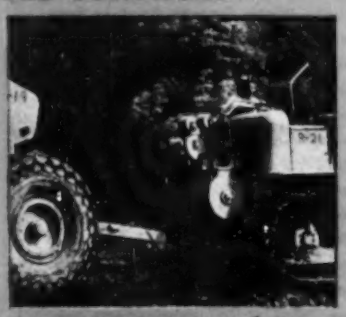

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fill runouts, ditches and other details affecting drainage and pavement durability; stations where changes occurred in cement types or other significant details of the mix originally used.

On these roads, which were from 10 to 14 years old, no scaling or disintegration "D" cracking was found on any sections built with air-entraining portland cement or a blend of air-entraining cement with natural cement. Considerable scaling (38 per cent of slabs) occurred with sections using a blend of non-air-entraining portland cement with natural cement containing fat. Scaling on 60 per cent of slabs developed where non-air-entraining portland cement alone was used. Blends of portland and natural cement with fatty material omitted, scaled on 100 per cent of the slabs.

This paper, covering projects scattered over a 500 mile area, constitutes a complete confirmation of claims for the resistance of air-entrained concrete pavements to freezing and thawing and de-icing chemicals. The introduction of air-entrainment was characterized as the most important single development in concrete technology in the past decade.

**Sight Distance.** A driver speed and behavior study was presented by Bernard A. Lefeve, Director, Bureau of Highway Planning, New York State Department of Public Works. The study indicates that design and uniform pavement markings alone will not solve the problem of maximum highway safety; in addition, drivers must exercise good judgment consistent with existing highway facilities. The study revealed that high speed was one of the principal factors in most accidents on vertical curves.

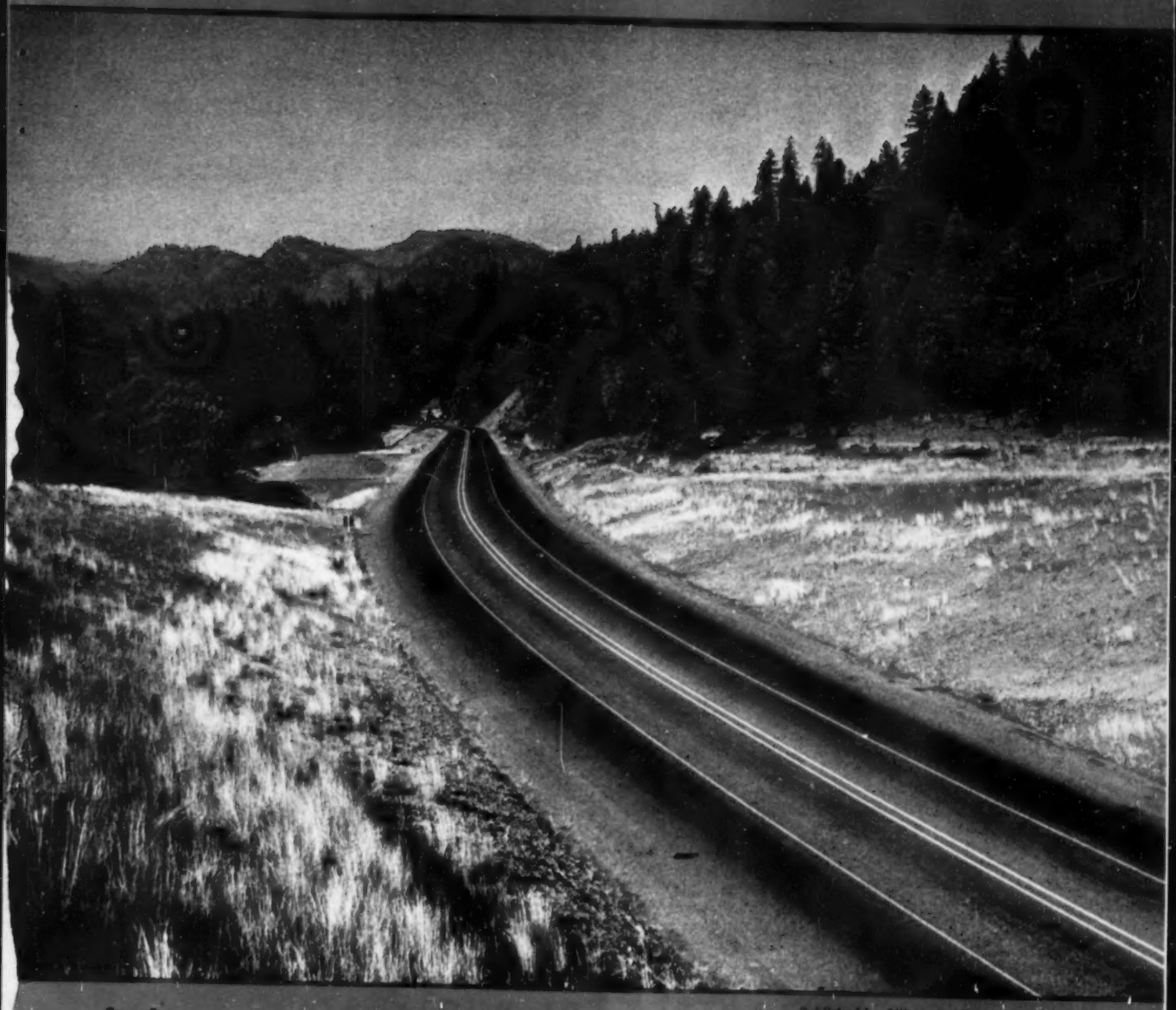
The findings were based on driver-performance data recorded in 2,000 observations for free-moving passenger cars at the sites of 20 vertical curves on two-lane rural highways in New York State. Mr. Lefeve said, "it is apparent that the majority of drivers of passenger cars do not decrease their speed appreciably when confronted with restrictive sight distance on vertical curves," and that because the future indicates higher powered passenger cars and increased speeds, "adequate sight distance for safe driving conditions should be provided in new design to reasonably meet this anticipated speed demand.

A minimum sight distance of about 325 ft. is required for average speed on a main rural highway; 400 ft. is adequate to meet the needs of 85 per cent of drivers; 425 ft. for 90 per cent, and 470 ft. for 95 per cent."

The driver behavior study was carried on by the Vehicle Operation Section of the Department's Bureau of Highway Planning, in cooperation with the Highway Transport Research Branch of the Federal Bureau of Public Roads.

*(Report to be continued in the March issue)*

# Bituminous ROADS AND STREETS



**Cover Scene**

Completed section of U. S. 99 between Grants Pass and Roseburg, Oregon, which is being reconstructed to modern standards, with truck-laning on grades.

Published by Gillette Publishing Company
221 West Maple Street, Chicago 10, Illinois

**North Carolina's New Flexible Pavement**
**98½-mile Turnpike Shoulder Contract**
**Moisture—The Continuing Problem**
**Notes on Patching in Arkansas**

FEBRUARY, 1953

Secondary roads in Ionia County, Michigan, are among the finest in the country. Back of these roads is the experienced and expert supervision of Allen M. Williams, right, County Road Engineer and Superintendent, shown here with Howard M. Rotrock, Standard Asphalt Engineer.

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Through the use of these road oils, road builders gain a flexibility that is invaluable to good secondary road construction. Because Standard road oils do not harden excessively, roads laid with these oils can be reworked easily when necessary.

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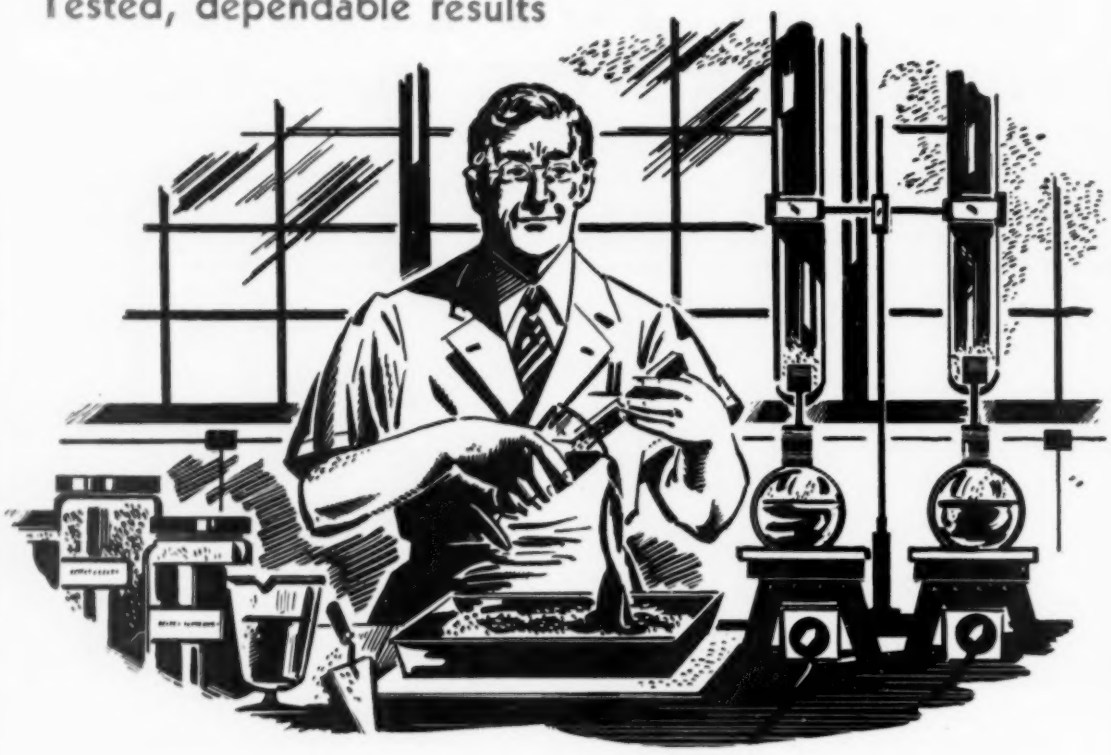

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★ Build-up operation for inner shoulder. Note hand brooming to keep pavement constantly clean

# 98½ Mile Turnpike Shoulder Contract

**How Union Building & Construction Co. and Subcontractors raced with winter to carry out unique shoulder patching, strengthening and sealing program on the New Jersey Turnpike**

***Roads and Streets Staff Report***

ONE of the final scheduled touches on the New Jersey Turnpike was largely completed during the autumn months. Consisting of building up and armoring of the shoulders along 98.5 miles of the road, the operation was one of the largest of its kind ever awarded in a single contract. The contractor was Union Building & Construction Co., of Passaic, New Jersey. Their $443.000 job, awarded September 26, included as a chief item 1,800,000 sq. yd. of final seal along some 400 miles of inner and outer shoulders.

The Turnpike, it will be recalled, was graded and paved for its full 118 miles in the two years, 1950 and 1951, and opened in November and January a year ago. The design included 5 ft. inner and 16 ft. outer shoulders, 10 ft. of which was stabilized and treated along each of the divided roadways.

Ten inches of compacted, stabilized gravel plus a single bituminous surface treatment was placed initially on all shoulders from the southern end of the Turnpike north to the Raritan River at New Brunswick, a total of 84 miles. From the Raritan River to Morse's Creek (14.5 miles) 7 in. of gravel was topped in the original construction with 3-in. penetration macadam, which included 1.75 to 2.25 gal. per sq. yd. of 120-150 penetration asphalt cement for a binder and a seal coat of 0.33 gal. of the same binder material. From Morse's Creek to the northern terminus (19 miles), untreated stone screenings were used.

The shoulder contract here reviewed encompasses the entire southern portion and the penetrated surface northward from the Raritan River to Morse's Creek, 98.5 miles total.

The largest part of the shouldering on the southern part of the road remained in excellent condition throughout 1952. The recent contract was much in the nature of a stage operation. Some of the shoulders on the central portion endured less well during the first year of traffic, due largely to the haste and adverse conditions of completion. Much of the central shoulders were placed too late in the 1951 year for best results. Turnpike officials considered it of great economic importance to open the road to public service and earning toll revenue, and expected to correct deficiencies by means of the shoulder program herein described.

### Principal Quantities for 98½ Mile Turnpike Shoulder Job

40,000 gal. tar for prime
55,000 gal. cut-back for prime
2,250 tons broken stone, new
3,000 tons broken stone, salvaged
3,500 cu. yd. excavation
250,000 sq. yd. building up shoulders
130,000 sy. yd. scarify or regrade, prime, and initial surface treatment
1,800,000 sq. yd. final surface treatment of shoulders throughout job
(Also included in original $443,000 contract: 50,000 sq. yd. of heavy-duty stone bituminous treated flexible pavement for truck parking at service area along project).

### Four-Purpose Job

Specifically, the contract was awarded for a series of operations designed to accomplish not one purpose but four, as follows:

1. Patch all spots and areas which have ravelled.
2. Rebuild more extensive areas where necessary.
3. Build up sections with addi-

★ (At Left): Shoulders along section of New Jersey Turnpike, showing wear and tear from first year's operations. Note lack of contrast with pavement edge. (At Right): Completed resurfacing of outer shoulder. Note light colored rock and sharp contrasts between shoulder and traffic lane at left

tional material where necessary to bring shoulder to proper cross-section.

4. Final sealing throughout.

**1. Patching Procedure.** First step was to sweep the shoulders thoroughly with power brooms to expose holes and weak spots. Loose material thus accumulated was dispersed outside of the outer shoulders, or windrowed, picked up and stockpiled from the inner shoulders. Holes were then primed with RT-3 tar or MC-0 asphalt. After curing out, patch areas were brought up to the level of adjacent shoulder areas with RC-3 and ⅝-in. stone cover.

**2. Rebuilding.** This operation was specified for selected areas where the shoulder was found too high or out of slope. Ordinarily the first step was to scarify to a depth of about 3 in. At other times the surface was shaved with a motor grader. The locations were then rolled, primed, cured out, and an initial seal with ⅝-in. stone applied as in the patching. Sometimes steps 1 and 2 were combined into a single operation.

**3. Building Up.** This was done wherever a dip occurred or the shoulder was found to be definitely lower than the pavement. Sometimes a light gravel application was necessary. Ordinarily the procedure consisted simply of a preliminary seal using RC-3 and ⅝-in. stone.

The combination of 1, 2 and 3 resulted in truing the shoulders and supplying at least one thickness of asphalt and cover stone.

**4. Final Seal.** The repaired shoulders were swept again, to thoroughly remove dust and lose particles, and a final seal coat applied consisting of .25 to .30 gal. per sq. yd. of RC-3 asphalt and 25 lb. per sq. yd. of cover stone. Cover stone for this seal as for preliminary spot or area sealing consisted of dolomite produced by New York Traprock Corporation and limestone produced by Bradford Hills Quarry at Downingtown, Penn. The final seal was not broomed. This stone has given the shoulders a definitely light color, affording a sharp contrast with the dark colored pavement surface.

A preliminary spot treatment with a light "fog" prime was employed in some special areas where the power broom was unsuccessful in getting all the dust. This was considered necessary to help the subsequent seal penetrate properly.

Darakote in the amount of 1 per cent by weight was specified (supplied by Dewey & Almy Chemical Company) as an anti-stripping agent with all rapid curing asphalt materials for preliminary and final sealing. While the specifications required that the patching be done when holes were dry, a liberal interpretation was placed

★ (At Left): Patching crew, first unit of "assembly line" which also includes rock truck in rear with workmen hand shoveling aggregate onto patched areas, followed by brushing and rolling. (At Right): Asphalt being applied in first phase of final surface treatment on outer shoulder

★ (At Left): Rock truck with special gate for applying cover stone. Work is in progress despite rain, made possible by use of anti-stripping additive. (At Right): Rolling was followed by brooming of loose particles off of pavement

on this detail in order to insure completion of the bulk of the work by winter. The contractor, who began late in September, was well on the way to completion by early November, aided by an exceptionally open, dry Autumn season.

### Job Management

The contractor sublet the southern half or 49 miles of Turnpike to three contracting firms: Charles Bancheri, of Hammonton, N. J.; South Jersey Construction Co., Riverside, N. J.; and De Bello Construction Co., Vineland, N. J. Each company was assigned work more on a functional than a geographical basis. South Jersey performed repair work, while all three companies took part in the final sealing. The work of subcontractors went on simultaneously with that of Union Building & Contracting Co. on its 49½ miles.

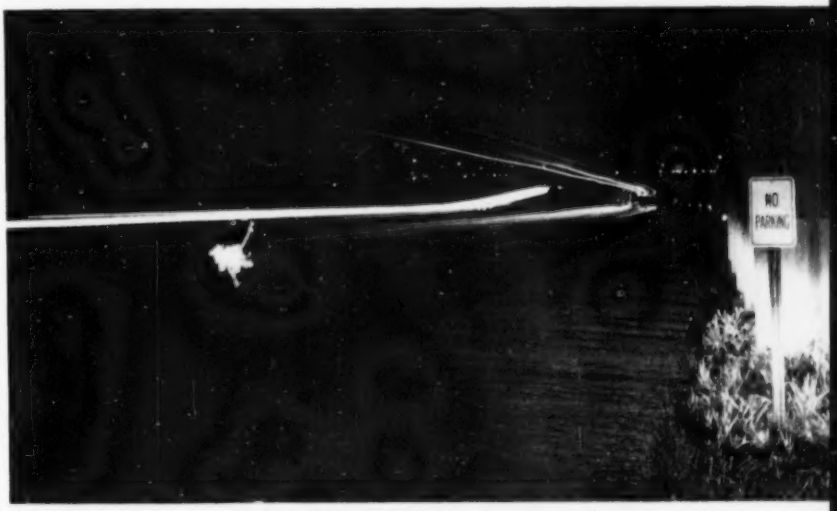
Union Building & Contracting Co. set up an organization under a superintendent, with 1 assistant superintendent, 6 foremen, and about 50 operators and workers, including at least one flagman for each work location.

Six crews, more or less, worked on patching and rebuilding, this being a fluctuating operation dependent somewhat on weather, waiting on curing of prime, and the need to synchronize with other work to make best use of available men and machines. From one to three crews worked at times on building up of local areas.

Several methods were used to block out the work. For patching and rebuilding, the general scheme was to work clear through the northern 49½ miles on the outer shoulder, coming back on the other roadway, then make a similar round trip for the inner shoulders. On the southern 49 miles, both outer and inner shoulders were patched, working the inner shoulders first and cleaning up a section at a time usually consisting of the 10 miles or so distance between major interchanges.

Final sealing was handled in longer sections. For example the 34 miles between Mile Posts 49 and 83 were sealed first on the outer, then on the inner shoulders. Final sealing was performed late in the season, in a "nick of time" procedure taking the shortest possible time to treat the 400 miles of inner and outer shoulder.

★ The shoulder program has lent a spic-and-span appearance to the New Jersey Turnpike. Photo by Roads and Streets editor, November, 1952. Bridges in foreground include tri-level crossing of New Jersey Route 4 Parkway and a local highway




★ Night-time visibility of shoulders and clear delineation of pavement edge were achieved by the use of white cover stone on the shoulder resurfacing. This scene taken shortly after completion. (Note the "no parking" sign underneath the bridge in foreground, placed to discourage truckers from stopping to sleep or rest under overpass decks)

The contractors began preliminary work about October 1, the sweeping job taking considerable time. While

★ (At Left): Flagman, traffic cones and warning signs played an important safety role. Patching crew is working on other side of bridge shown in foreground. (At Right): Truck or jeep with 2 flashing amber lights was also posted in advance of each patching crew

sweeping was in progress, other parts of the work were organized and started, and by late in the month the project was in full swing. Union Building and Construction Co. variously deployed an outfit consisting of 4 power sweepers (3 on Huber tractors, 1 on an Adams grader); 18 ten-wheel dump trucks on cover stone (Mack and Autocar); 5 bituminous distributors, 1200 to 2200-gal. (Etnyre, other) mounted on single-axle or 10-wheel trucks; 3 4000-gal. asphalt tankers (Macks with semi's); 6 tandem or 3-wheel rollers (Galion); 8 pickups (Ford and Jeep); 2 motor graders (Caterpillar No. 12); 1 loader (Hough); several mechanic and lube trucks—some 48 units in all. Also several hundred traffic cones were required.

A typical patching crew utilized 1 power broom for cleaning up immediately ahead of the work, and for keeping the pavement clean; two rollers; and 5 to 8 trucks on stone hauling.

The three companies on the south end used equipment similar in type and number to that described above.

Union's aggregates were barged in for the northern half of the work, and asphalt materials were delivered by tank trucks directly from the refinery in transport trucks which were stationed at various points along the job to supply heated material to the distributors.

### Flagging Important

One of the most carefully planned and supervised parts of the work was that of accident prevention. On each operation the contractor was required to follow a definite agreed sequence of safety precautions. These included use of traffic cones to block off the lane next to the work, the cones being placed in a diverging line several hundred feet long. A flasher-equipped pick-up or jeep was stationed ahead, along with warning signs and a flagman (see accompanying statement on the details).

The men were kept constantly aware of the safety problem. At this writing, late in November, no accident had occurred in connection with this project, which involved perhaps the most extensive and continuous exposure of employes to traffic hazards of any highway maintenance-type contract job in history.

It is interesting to note that some difficulty occurred due to the fact that the contractor's men were unaccustomed to maintenance-type work. They were more used to "big yardage" jobs rather than to a deployed operation involving small quantities subject to close engineering direction and uncertain timing. Nevertheless the men soon acquired the knack, and good efficiency was achieved. Certain aspects of the job, however, required constant vigilance by both the Turnpike and the contractor management, alertness in flagging being a case in point.

Color contrast achieved in resealing was considered extremely important for night-time safety and as a means of keeping traffic from using the shoulders indiscriminately. The program has resulted in a spic-and-span "finished" appearance having definite good will or psychological value. Turnpike officials expect the shoulders to hold several years with only nominal maintenance.

Traffic volume averaging 50,000

## Special Contract Provisions for Maintaining Traffic and Preventing Accidents

*(Specifications governing conduct of work on the New Jersey Turnpike shoulder contract; Union Building & Construction Co.)*

- Plan of operation required to be submitted to Engineer and approved before starting work.
- No spillage of bituminous materials permitted on Turnpike pavement—extraordinary care required to prevent such, or to remove quickly when occurring.
- Contractor held liable for traffic accidents and vehicle damage resulting from spillage of bituminous materials.
- Contractor permitted to utilize full shoulder width plus 2 ft. of adjacent pavement when working on outer 10 ft. outer shoulder; or full shoulder plus 7 ft. of adjacent pavement when working on 5 ft. inner shoulder.
- Simultaneous work on two adjacent parallel shoulders of one roadway not permitted.
- Contractor to provide all barricades, lights, flagmen and directional and caution signs, etc., at own expense.
- Encroachment of equipment on traveled way to be kept to a minimum, with special care to arrange equipment and schedule work so as not to impede traffic during peak hours.
- Contractor must cease operation should any authorized representative of the Turnpike Authority notify him of a hazardous practice, and may not resume work until remedial action is taken to the Engineer's satisfaction.
- Any working, standing or parked equipment on the pavement or shoulder must be protected at all times by:
  - —Warning sign of adequate size placed 1 mile ahead, consisting of a yellow panel with black letters: "Slow—Construction Ahead."
  - —A flagman stationed ¼ mile ahead.
  - —Wooden barriers or traffic cones painted yellow and black, so placed as to channel traffic past the work.
  - —Signs as directed by the engineer, reading "Reduced Speed," "Men Working," "45 M. P. H.," "Single Lane Traffic Ahead," "Resume Speed," etc.
- At least one hour before sunset, all equipment, materials, etc., must be removed from work areas and parked or stored off traveled way.
- No construction permitted on Saturdays, Sundays or holidays without written permission.
- Pavement or shoulder conditions representing traffic hazards in connection with work, to be marked properly.
- Trucks or equipment parked overnight or week-ends at the work site may be parked on the far side of an overpass pier, well beyond face of pier and at least 13 ft. outside of shoulder edge.
- Slow-moving equipment being transported to work sites must be properly guarded against traffic mishaps, by moving it along the shoulders where possible, moving only in daylight hours, trailing the equipment at safe distance with a vehicle equipped with blinker lights, and displaying red flags prominently on the equipment.
- Crossing of median strip or making U-turns with equipment prohibited except at established points, where a flagman must be stationed during the cross-over.
- All contractor personnel discouraged from crossing the Turnpike.
- "Please encourage your men to think, talk—and ACT—safety for themselves and Turnpike users."

daily along the Turnpike in 1952 has focussed attention on the importance of the shoulders. They are designed as emergency turnout lanes, in case of tire or mechanical trouble. But since vehicles using the shoulders must finally re-enter the traffic stream, they constitute a hazard. Present policy is to forbid truck drivers and others from stopping on shoulders except where it is impossible to reach one of the Turnpike's ten service areas. The present shoulder contract included an item for building nine truck stands at service areas, totaling 50,000 sq. yd. of heavy-duty stone scaled with asphalt.

The project, which will be completed this Spring, is being supervised by the Turnpike general consultants, Howard, Needles, Tammen & Bergendoff of New York City. Sterling R. Mitchell is Project Engineer for the consultants; working closely with the Turnpike personnel. Aiding him is a supervisory staff consisting of a resident engineer and a chief inspector for each half of the job, each with six inspectors. Charles M. Noble is chief engineer and Stanton C. Funk construction engineer for the New Jersey Turnpike Authority. Harry Johnson was superintendent for Union Building and Contracting Co.

★ (At Left): Brushing loose cover stone particles off of pavement at sundown, as the crew finished work. (At Right): Loose material from patching operations was cleaned up with loaders

# Notes on Patching Methods in Arkansas

*From W. E. Carter, Maintenance Supervisor, Arkansas Highway Department, Little Rock.*

A joint research project is being conducted in which the Arkansas Highway Department is cooperating with the Engineering Department of the University of Arkansas. In the course of the experimentation, a small portable maintenance mixer for producing hot mix was used. The result of the work was inconclusive as to service and durability and the unit cost of the production was deemed excessive. No equipment for this type of work has been acquired recently by this Department.

This Department has used centrally produced hot mix when this material was available from contractors plants or from conveniently located commercial plants.

### Arkansas, Composition for Wearing Surface

| | Type 1 | Type 2 |
|---|---|---|
| Total retained on 1" sieve | - 0% | - — |
| Total retained on ¾" sieve | 0 - 15% | - 0 |
| Total retained on No. 4 sieve | 30 - 50% | 25 - 45% |
| Total received on No. 10 sieve | 45 - 65% | 40 - 60% |
| Total passing No. 40 sieve | 15 - 35% | 15 - 35% |
| Total passing No. 200 sieve | 5 - 10% | 5 - 10% |
| Liquid Asphalt | 4% to | - 7% |
| Emulsified Asphalt | 6% to | - 8½% |

### Arkansas, Hot-Mix Base Course

| | Type 1 | Type 2 |
|---|---|---|
| Total retained on 1½" sieve | 0% | — |
| Total retained on 1" sieve | — | 0% |
| Total retained on ¾" sieve | 15 - 30% | 5 - 20% |
| Total retained on ½" sieve | — | 20 - 40% |
| Total retained on No. 4 sieve | 50 - 65% | 45 - 60% |
| Total received on No. 10 sieve | 65 - 80% | 60 - 75% |
| Total passing No. 40 sieve | 10 - 25% | 10 - 25% |
| Total passing No. 200 sieve | 0 - 5% | 0 - 5% |
| Bitumen | 3.7 - 7% | 3.7 - 7% |

### Arkansas, Hot-Mix Surface Course

| | Type 1 | Type 2 | Type 3 |
|---|---|---|---|
| Total retained on 1" sieve | 0% | — | — |
| Total retained on ¾" sieve | 0 - 15% | — | — |
| Total retained on ½" sieve | — | — | 0% |
| Total retained on No. 4 sieve | 35 - 55& | 25 - 45% | 20 - 40% |
| Total received on No. 10 sieve | 50 - 65% | 45 - 60% | 40 - 55% |
| Total passing No. 40 sieve | 15 - 30% | 15 - 30% | 15 - 35% |
| Total passing No. 200 sieve | 4 - 10% | 4 - 10% | 4 - 10% |
| Bitumen | 5 - 6% | 6 - 9% | 6 - 9% |

### Patching Methods

We have used hot-mix for over-lay surfacing on considerable stretches of spalled and broken concrete, instead of cutting out such areas and replacing with concrete. The minimum size patch we recommend is approximately 3 in. thickness over the full width of the pavement, covering not less than 10 linear feet over the broken area and feathering out 20 ft. each way, making the total length of the application 50 lin. feet.

When patching small areas under 25 ft. in length, it is believed that the broken area should be pulverized with a pneumatic pavement breaker, adding additional base material required, and providing proper sub-base drainage out through the shoulders adjacent to the patch. On longer broken sections, we do not pulverize the pavemet, but we do cut the shoulders down several inches below the pavement edges and rebuild the shoulder with permeable materials or crushed stone properly compacted. This procedure is followed especially in cases where the sub-grade is found to be unstable or otherwise unsuitable. Where the original pavement width on heavily traveled sections is 18 ft., we usually extend the asphalt surface on the prepared shoulder to obtain a width of 21-24 ft.

Suitable equipment for processing and laying is essential for best results with hot-mix. Such equipment includes self-powered pavers or finishing machines, three wheel 8-10 rollers for initial compaction, and tandem rollers of 8-10 ton weight for finishing.

Strictly speaking, we do not use hot mix for minor patching. For this purpose, we ordinarily use a dense graded cold plant mix wearing surface, commercially produced, especially when within economical truck haul limits of the job.

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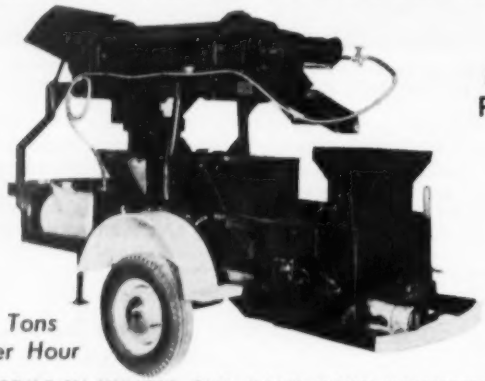

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Up To 5 Tons Hot Mix Per Hour

USE PATCHMOBILE IN WINTER AND HAVE GOOD PAVEMENT IN SPRING

HIGHWAYS

Road maintenance departments can save real time and money by using the PATCHMOBILE for fast repairs, because smaller crews can do bigger jobs and more of them.

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The compact design of the PATCHMOBILE makes it an ideal piece of equipment for repairs to City streets. Traffic congestion is at a minimum and safety at a maximum when PATCHMOBILE is on the job.

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**Municipalities, counties, State Highway Departments, contractors, and Public Utilities are finding the use of Patchmobile the best way to achieve better highways and streets with year around maintenance.**

PATCHMOBILE FEATURES:

1. ROTARY TUBE DRYER gives continuous hot dry material which is discharged into the batching hopper.
2. BATCHING HOPPER accurately measures aggregates, assures proper percentages of asphalt and aggregates.
3. TWIN HOT ASPHALT TANKS—one type of asphalt can be used in pugmill and another can be carried for seal and tack coating, or the same asphalt can be carried in both tanks for double capacity.
4. HEAT JACKETED PUGMILL has cut and convey blade action which produces continuous thorough mix.
5. TOOL HEATING COMPARTMENT for smoothers and tampers which are useful when making small patches.
6. POWER PUMP AND HAND SPRAY BAR delivers 5 gallons per minute of hot asphalt through flexible hose for seal and tack coating.
7. BUILT-IN THERMOMETERS AND DAMPERS for maintaining asphalts at correct temperatures.

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## Letters to the Editor

*Sir:*

I was interested in Mr. J. R. Schultz's description of Hotseal coat in January '52 issue of Roads and Streets which I have just seen. The process of Heating Chippings may be new to Mr. Schultz, but it may interest him and your readers that my Company introduced this method in England nearly 20 years ago, and work carried out in 1934 and 1935 is still in good condition and has had no further treatment.

The binder is applied by a Johnston machine fitted with Rotating Brushes at about 5 yards per gallon and ⅝-½" chippings dried in a rotary drier and applied while still hot at approximately 60-70 yards per ton. After initial rolling the surface is heated and sanded and re-rolled.

This process was originally applied to a fine asphalt carpet laid by graders and planers and known here as Nimpactocote. The perfect running surface produced by the planing of the asphalt had to be preserved and care was, therefore, necessary to make sure that the Hot Chip finish as it is called—was an even coat of one Chipping and that no slight bumps were created by having one chip on another.

This Hot Chip Dressing is now well known and considerable areas are done each year in this Country, not only on Nimpactocote but also on surfaces which have been Heated and Planed, a method of improving running surfaces which was originated and developed by Johnston Brothers Contractors Limited of London.

*—W. P. Wilkins, Johnston Brothers (Contractors) Ltd., 721 Ibex House, Minories, London, E. C. 3.*

*Sir:*

I appreciate very much your kindness in sending to me a special copy of December Roads and Streets which contained the talk made by Mr. Hoover at the National Safety Congress.

It was flattering to the A.G.C. of Missouri to have you devote that much space to our efforts to reduce accidents. But the most important thing is that in publishing that article and commenting on it so favorably we hope that contractors' organizations all over the country will make a similar effort. It is important that they do so because an intelligent and enthusiastic effort to prevent accidents is the only way that we can think of to stop any bills which may be proposed in Congress to create a bureau of accident prevention in the Department of Labor.

There were at least two such bills in 1952 and one in 1951. Such a bureau in the Labor Department would simply be another governmental bur-

eau with indefinite and unlimited power to do whatever it wants to do. The danger of such a bureau was shown by the statement of the author of the first of those bills, who stated that the object of such a bureau would be to improve upon the old method of showing men how to take care of themselves by having the agents of the bureau authorized to change the processes and methods of doing construction work.

A bureau of that kind carried out by men appointed by the Secretary of Labor would, of course, mean the death of private enterprise in the construction business. Because we can only stop such a bill by showing that it is unnecessary and that it proposes to do what we contractors are already doing, your publication will help us in getting A.G.C. chapters and everybody else all over the country to doing a good job along safety lines.

*—E. C. L. Wagner, Manager, Associated General Contractors of Missouri, Jefferson City.*

## California bituminous projects built smoother

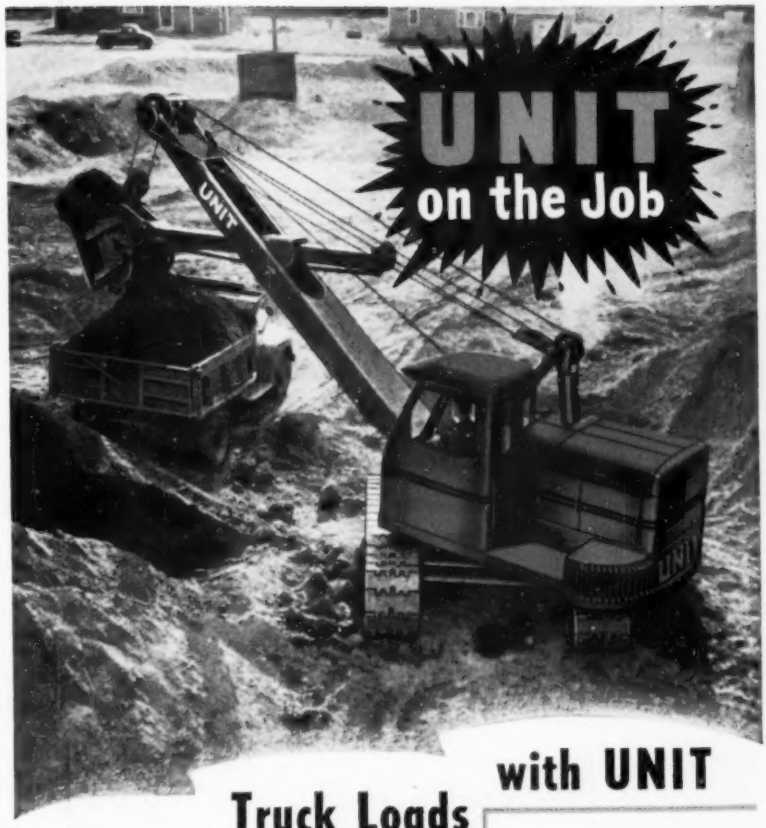
California state highway projects completed each year are reported and compared as to the average surface roughness. The average for all plant-mix bituminous projects completed during 1951 was 11.4 in. per mile.

This low figure plus the similarly low average of 11.2 in. for 1950 projects is in sharp contrast with averages for the years 1940 to 1949, which ranged from 14.6 to 23.1 in. per mile.

Road-mix surfaces built during this period in California also were made progessively smoother, as shown by an average index of 21.2 in. per mile for 1951 projects, compared with 23.4 to 49.2 in. in prior years.

• The Texas Highway Commission recently load-zoned an additional 234 miles of Farm to Market roads, found to require special load restrictions as the result of careful traffic and engineering investigations. Zoning for 12,000 lb. maximum axle load and 40,000 lb. gross load limit.

★ C. P. Street, 1953 nominee for president, Associated General Contractors of America. Mr. Street is secretary-general manager, McDavitt & Street Company, Charlotte, North Carolina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★ Spreading "Stabilized Aggregate Base Material" with Jaeger spreaders

# North Carolina's New Flexible Pavement Methods for Primary Highways

**By T. V. Fahnestock**
Bituminous Engineer
North Carolina State Highway and Public Works Commission, Raleigh

FOR many years North Carolina has been constructing flexible pavements using various types of base course materials. These include sand clay, topsoil, various types of macadam, portland cement stabilized soil, sand asphalt, and some bituminous concrete (black base).

With few exceptions, the base courses for the primary highways have consisted of some type macadam when flexible pavement was used. For about 25 years such base courses have been designated as Traffic Bound Macadam. This designation has become a misnomer. These base courses consist of crusher-run stone or gravel with a maximum size of 2-in. This material being placed on the subgrade in layers and compacted by rolling with various kinds of rolling equipment. When this type construction was first started, the base material was placed and compacted by traffic, but this became impractical with the increased volume and speed of traffic.

### Moisture Problem

The so-called Traffic Bound Macadam bases have given excellent results; however, this type construction has certain disadvantages. These include segregation of the coarse and fine material as well as the fact that often such material, as produced, does not contain sufficient minus No. 4 material to provide a dense well-bonded base course. In order to obtain the right moisture content for compaction to the proper density it is necessary to add water after the base course has been spread on the road, or to manipulate the base material to dry out excessive moisture following rains. Also where the material does not contain sufficient fines or where segregation occurs, road mixing is necessary to overcome these deficiencies.

The fact that the total thickness of Traffic Bound Macadam material could not be placed, shaped and compacted satisfactorily in one day, makes this type of construction subject to weather hazards. On many jobs the first course of base material has been placed upon a well compacted subgrade, but before it could be compacted rain occurred and penetrated to the subgrade, thus requiring a tedious and costly operation to dry out the subgrade and base material before satisfactory results could be expected.

Early in 1952 it was decided to write a specification for a base course with the idea of overcoming as many of the difficulties which had been encountered on past construction of this nature as possible. This specification was designated as Stabilized Aggregate Base Course. The coarse aggregate for the base course consists of crushed stone, crushed or uncrushed

• *Describing North Carolina's new Stabilized Aggregate Base Course specifications, designed to provide greater weather resistance during construction, better durability under heavy traffic, and wide adaptability in use of local materials. First used on U S 29 during 1952, this type of construction is now contracted or planned for 75 miles of primary roads.*

★ Plant of Superior Stone Company, Midland, North Carolina. Mixing units for US 29 project on left. Note stockpile of soil "fines" behind truck

gravel, crushed blast furnace slag, or other inert materials having similar characteristics.

### New Specifications

The material retained on the No. 4 sieve is required to consist of tough durable pieces of aggregate having a Los Angeles loss not greater than 45% and a loss of not more than 15% with five alterations of the sodium sulphate soundness test.

The material passing the No. 4 sieve is known as "fines" and shall consist of screenings, produced by the crushing of acceptable aggregate, or of other material of satisfactory bonding value.

The base material, when analyzed prior to spreading on the road, shall meet the following grading requirements:

| Sieve Designation | Percentage by Weight Passing |
|---|---|
| 2 inch | 100 |
| 1 inch | 75-95 |
| ½ inch | 60-75 |
| No. 4 | 45-60 |
| No. 40 | 15-30 |
| No. 200 (Not less than 5% nor more than ⅔ the percentage passing the No. 40 sieve) | |

After the base course has been completed, that portion of the material which passes the No. 40 sieve shall have a plasticity index not greater than 6 and a liquid limit not greater than 25.

The specifications provide that the materials for the base course shall be mixed in an approved mechanical mixer and that water shall be added during the mixing operation in an amount to make the total moisture content of the mixture not less than 5% by weight and sufficient to make a workable mixture.

When specified to be used, calcium chloride flakes shall be added at the mixing plant at the rate of 7 lb. per ton of mixture.

It is required that the base material be spread by mechanical spreaders in layers of controlled thickness and that each course shall be shaped and immediately compacted before the succeeding course is placed.

The full thickness of base course to be constructed is placed in successive layers as early as practicable after the preceding layer has been compacted. A density not less than 100% of that obtained by A.A.S.H.O. Test T99-49 is required. Shoulder material is placed for a width of at least 5 ft. adjacent to the edge of each layer of base material in order to confine the base material to the proper width and permit compaction of the edges. Compaction is obtained by rolling with pneumatic tired and ring rollers. The rolling is extended over the edges of each layer of base material for a minimum distance of 3 ft. on the shoulders in order to prevent the infiltration of water at the edges.

This specification is intended for use on heavy duty highways and it is proposed to be used as stage construction. The wearing surface over the stabilized aggregate base course will eventually consist of a densely graded bituminous concrete surface course. However, in the stage construction process, bituminous surface treatment is applied and used by traffic for several years. A separate contract will be let for the bituminous concrete when required.

### First Project, US 29

The first project to be constructed under this specification was a section of US Route 29, 16.55 miles in length. This project is located north of Charlotte and is the dual lane paralleling the existing 22-ft. concrete pavement. The grading and structures for this section had been let under previous contracts.

When bids were requested for the pavement, alternate proposals were included covering 9 in. uniform portland cement concrete, 24 ft. wide, to be placed on 4 in. depth of subgrade reinforcement; or 14 in. thickness of stabilized aggregate base course having a width of 24½ ft. with bituminous surface treatment, the extra 6-in. width of stabilized aggregate being provided to take care of the placing of the bituminous concrete at a later date.

The Propst Construction Company of Concord, North Carolina, was the low bidder on the stabilized aggregate alternate. This Company submitted a bid of $602,620.65. The difference between this bid and the low bid for the alternate type was more than sufficient to take care of the estimated cost of the bituminous concrete pavement which will eventually be used on this road.

The stabilized aggregate base course material for the project was furnished by the Superior Stone Company of Raleigh from their Midland plant. The stone from the Midland quarry has a Los Angeles loss of around 17, and the ordinary crusher run material contains only approximately 30% minus No. 4. Friable non plastic soil was added to the crusher run material, and it was necessary to add a minimum of 20% soil to produce a mix having the required percentage of fines.

A special mixing plant was set up at the quarry, mixing being done by a twin shaft pugmill. The crusher-run stone and the soil were conveyed to separate bins near the pugmill. Each bin was equipped with adjustable gate and electric vibrator, controlled by rheostats. The materials were fed from the bins onto a belt conveyor in the proper proportions by adjusting the gate openings and the vibrators.

### Chloride Added

Calcium chloride was used in the top 3 in. compacted thickness of the base course. The flake calcium chlo-

★ Making density test of base material on US 29 project

★ Initial rolling of base material in progress

ride was fed on the belt conveyor with the stone and soil through a separate bin, also equipped with a vibrator. The materials were carried to the pugmill by the belt conveyor and the mixing was continuous. The moisture content of the mixture was controlled by adding water from spray nozzles over the pugmill mixer.

The base material was spread on the road by two Jaeger spreaders, the 14 in. compacted thickness being secured in four layers, including top layer containing calcium chloride.

The two spreaders were operated close together and the full width of base course was placed with one spreader pass. Immediately after each layer of base material had been spread, shoulder material was pulled in to the sides and compacted for 3 ft. on each side of the base course. The contractor used a small pneumatic tired tractor with dozer for placing the shoulder material adjacent to the base and the rolling was started within a short distance behind the spreaders.

The initial rolling was done with pneumatic tired rollers, as the base material had a tendency to stick to the steel rollers until the surface of the layer being compacted had dried slightly.

By placing the base material with spreaders, which left the surface of each layer true to grade and cross section, very little blading was required on the base course. After the rolling had progressed to the point where the required density was obtained, the base material was found to be impervious. It is believed that this is one of the big advantages of this type construction. With the base material impervious and the shoulders thoroughly compacted it is virtually impossible for surface water to ever reach the subgrade.

The bituminous surface treatment was placed on this project in sections of three to four miles as the base course was completed. This surface treatment consisted of 0.18 gal. per sq. yd. of MC-0 for prime. As soon as the prime had cured the mat application consisting of 0.40 gal. per sq. yd. of 150-200 penetration asphalt was applied. This was covered immediately with 42 lb. per sq. yd. of 1¼-in. to No. 4 crushed stone and rolled. The bituminous surface treatment was completed by sealing with 0.39 gal. per sq. yd. of RC-2 and 35 lb. per sq. yd. of crushed stone, graded from ¾-in. to No. 16. The seal aggregate was mixed with the RC-2 using a long-base broom drag.

### 2,000 Tons Per Day

The stabilized aggregate base course material was placed on the project at an average of slightly more than 2,000 tons per working day. All work on the project was completed in October, 1952.

Under the pavement design method used in North Carolina, the project on U S Route 29 would call for a 17-in. compacted thickness of base and pavement. This job now has a total compacted thickness of slightly less than 15 in. but is holding up in an entirely satisfactory manner. The traffic on this section is approximately 7,000 vehicles per day.

The actual construction of the stabilized base course presents few difficulties; however, there are certain problems encountered in producing and controlling the mix. The moisture content in the crushed aggregate and the added fine material will vary with weather conditions. Therefore, the added water must be adjusted to compensate for these variations. On this particular project some difficulty was encountered in controlling uniformly the quantity of soil added to the mix, as the soil did not feed from the bin as readily when its moisture content was increased by rain. This difficulty was largely overcome by maintaining

*(Continued on page 92)*

★ Completed bituminous surface treatment on US 29 project

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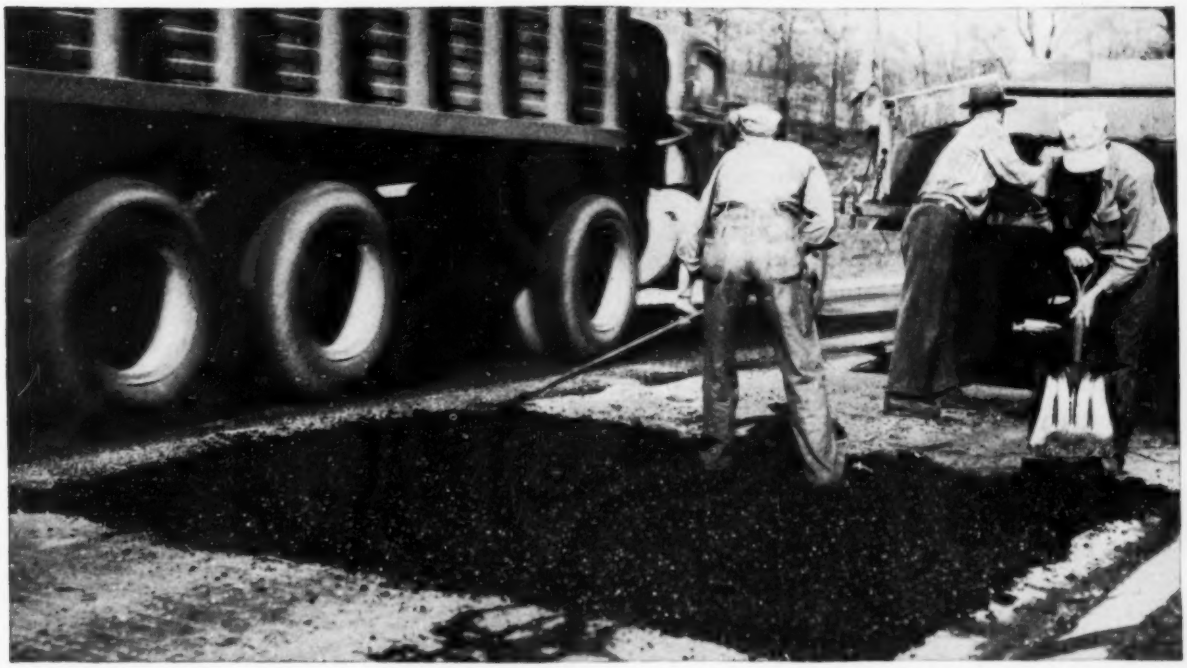

**THE PATCH** under the moving truck was opened to traffic immediately. Notice, too, that Komac Premix does not stick to tools.

THIS new, easy-to-apply road patching premix can be used all year round . . . rain or shine, hot or cold. Just sweep out the hole and patch with KOMAC Premix . . . compact thoroughly, then open to traffic.

KOMAC Binders, offered exclusively by Koppers, mix easily and quickly with local aggregate. Since KOMAC Premix stays workable in the stockpile for a year or more, it is immediately available for use when you need it most. *Koppers trademark

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## *in:* MACADAM BITUMINOUS MIXES, PAVEMENT WIDENING

Self-propelled Tandem Jackson Compactor (15-in. wide) compacting sub-base to specified density, in one pass, for blacktop pavement widening strip. Controlled by spreader operator, it easily keeps up with spreader. Rate: 38 ft. per minute.

The super-powerful improved Jackson Vibratory Compactor which, as a manually operated machine, has proved so extremely efficient in the compaction of granular soils, sub-bases for blacktop highway widening projects and highway blacktop patching and widening, is now available in multiple units — in widths to meet the requirements of any project of any size — tailored to fit.

At left is illustrated a two-unit (4 ft. wide) Jackson Vibratory Compactor on macadam base course work. It is applied to a diminutive tractor, on which is mounted a Jackson Power Plant for operating compactors. With this new, faster and better means of macadam densification, 10" depths of rock can be keyed and compacted in just two passes. Voids completely filled with fines in just two additional passes, which is the operation shown.

Jackson single-unit, manually guided Vibratory Compactor consolidating, to specified density, selected granular material used for backfilling in pipe line trench. Result — Pipe line is uniformly supported by compacted soil and top of trench stays to finished grade.

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## IN 12-INCH TO 12-FOOT WIDTHS

## TO MEET REQUIREMENTS

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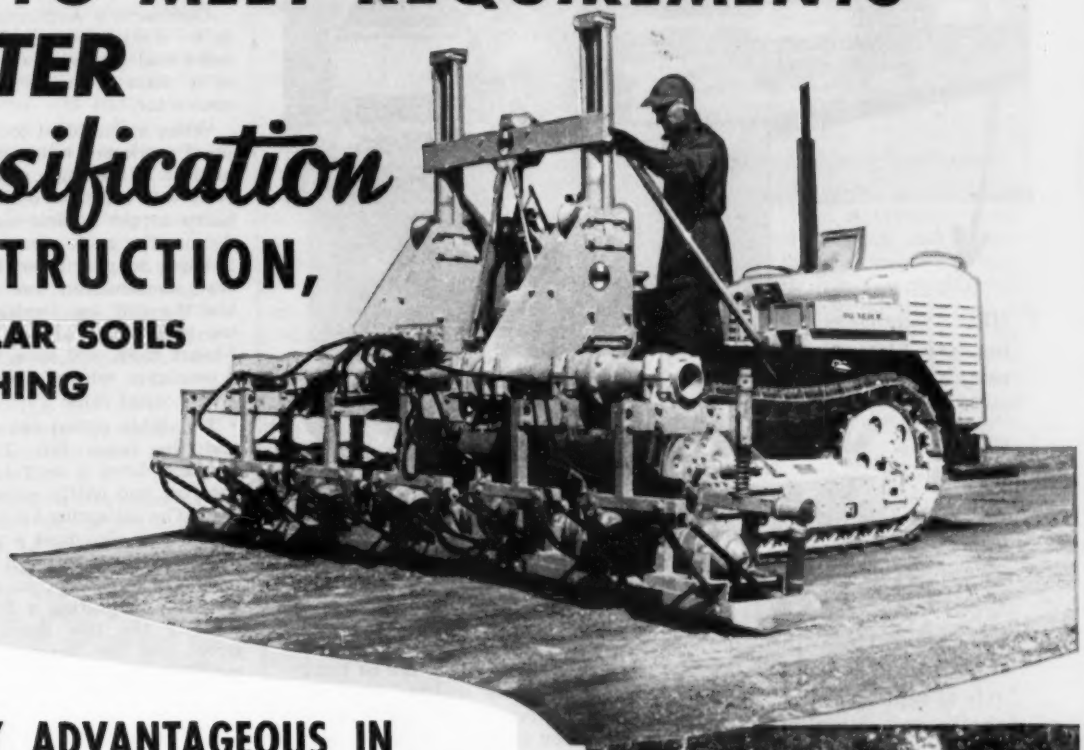

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In bituminous-sand-gravel and other mixed-in-place combinations Jackson Vibratory Multiple-Unit Compactors achieve greater density and save time and money not only by greater efficiency but also by eliminating previously necessary operations. Shown above, is a six-unit Jackson Vibratory Compactor application, (12-ft. wide and adjustable for crowns) working on stabilized road.

It will pay you to get the complete facts on this outstanding equipment, at once! See your Jackson Distributor or write to us, giving details of project contemplated.

Manually guided, self-propelled, this 24" Jackson vibratory Compactor, with quick-pick-up auto trailer mounting a Jackson Power Plant, is unmatched for blacktop highway patching and widening, paving drives, railway crossings, platforms, and compacting granular soil in bridge approaches, concrete floor sub-bases and many other applications.

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✓ Reinforced steel subframe welded integrally with the body to support the load uniformly and distribute the lifting forces of the hoist without bulging or distortion.

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✓ Simplified toggle principle design eliminates unnecessary troublesome parts.

✓ Arm assembly made of structural steel welded to extra heavy reinforced tubing. Hoist frame takes all stresses without transferring any stress to truck frame.

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## Job accidents set up chain reaction

Description of Accident: — While tightening the clamp bolts securing the drum end of the hoisting cable on a stiff leg derrick, a workman used a wrench with sprung jaws. It slipped and he suffered severe abrasions of the knuckles on his right hand.

Direct Cost of Accident: — First aid and physician's fee $4.00.

Contractor's Additional Cost: — As in so many cases, the cause of this accidental injury was also the cause of a chain of events costly for the contractor.

When the accident occurred, the injured workman who was completing his task of reeving a new cable, naturally left his task unfinished in his hurry to get to first aid and to the doctor. The cable clamp looked tight but was actually loose. In the confusion, its condition was not observed and the stiff leg derrick was put to use in lifting a 20" (20 foot length) I-beam from roof level to the top of a penthouse where it was to support a new water tank.

The cable pulled out of its clamp and the beam fell. In falling it knocked down a scaffold, landed on the roof and partly across a parapet wall. The collapsing boom of the stiff leg derrick dislodged a piece of cornice stone which fell 13 stories through the roof of an offset in the structure, rupturing a fire main and flooding the two floors above the street and the basement. Electrical machinery and power equipment in the basement was badly damaged.

The 20" I-beam was bent and twisted and had to be replaced. The scaffold also had to be replaced and repairs made to the boom of the stiff leg derrick. Of course, too, there were repairs to the roof and to the fire main, to the electrical equipment and much incidental work such as repainting, repapering, etc. Cost—$17,400.

Moral: — It's bad enough when a workman suffers injury but when on top of that the accident which caused his injury also causes a chain of events so costly in every way as in this case, it's time to do something effective in the way of prevention.

What to do? Remove the causes of accidental injury. Keep sprung wrenches and other unsafe tools off the job. Inspect all tools and equipment regularly under a good maintenance program. Above all see that important tasks such as reeving hoisting cables are supervised and checked after completion.

(Prepared by the Joint Cooperative Committee of the Associated General Contractors of America, Inc., and Association of Casualty Insurers.)

# VIEWS AND COMMENTS

By H. G. Nevitt

## Moisture—The Continuing Problem

Bitumens owe much of their success in road and street work to their ability to restrict or control water. Yet moisture constitutes a threat to successful bituminous construction that can never be forgotten. To this paradox we must add another: we wonder if the moisture limitations on hot mix aggregates are not being over-done, while complaining that the moisture problem in bituminous construction is possibly being overlooked by our younger engineers.

We feel that the drying of aggregates for hot mixes is too often being done by rule rather than reason. The specifications set only a moisture per cent, without consideration of the kind of moisture—that is, where it is located or how it is held—or the test procedure to measure the amount. A little practical common sense may be in order.

The aggregate should be dried sufficiently to insure the presence of a cementing film of bitumen on each particle. This calls for the removal of any surface water and that in any interstices or "pores" which might get on the surfaces and prevent this film being formed or maintained. This latter does *not* require the removal of water which is held in molecular attraction by the mineral—such as water of crystallization, or adsorbed water films—nor of water held so deeply in the particles by capillarity alone that it will not work out onto the exterior surface. Removal of such water is not merely useless—the attractive forces are usually so great that it will return in due course by diffusion through the asphalt film—but it results in a waste of drier capacity, operating expense, and often indirect problems such as the overheating of the mix due to excessive drier temperatures.

### How to Distinguish?

How do we distinguish between the two types of moisture? That is not an easy technical question; and the most desirable test technique to indicate that harmful moisture is no longer present, even though there is an appreciable percentage of water remaining, may be still a matter of opinion. We can however venture some commonsense guides which may be of practical help.

Moisture which takes excessive drier temperatures to eliminate, or which will not come out in a rapid wash with a solvent such as alcohol, is not moisture which should be removed. It is held by internal attraction, hence is not surface water. If it does cause harm the best answer is probably not excessive drying but discarding the aggregate, as it is likely to show stripping tendencies in time. A moisture content which results in no loss in stability (as compared to that for thoroughly dried aggregate) immediately after mixing or upon standing for several days can be tolerated. However we do not propose this as a general rule—with some aggregates, much higher moisture contents than will result from the most causual drying operation might show acceptability by it, and there is no need to permit these high levels. However, it might be given consideration for aggregates presenting drying difficulties.

Water boils at 212°—or lower, as the altitude increases above sea level. Due to normal adhesive forces and other film phenomena, and likewise to the need for a thermal differential across the aggregate surface layer, a somewhat higher temperature is required in the actual drying process—exactly how much above the boiling point depending on the time the aggregate is held in the heated condition. Laboratory drying should be given some time, and be held to a low temperature. In commercial driers the time interval is short, hence the temperatures need to be higher. But those appreciably above 300° F. (perhaps an even lower figure could be set) should raise doubts in the engineer's mind.

Need the water allegedly requiring such temperatures be removed?

Is the drier operation correct from the standpoint of residence time or intimate contact between all the aggregate particles and the drying gases?

At such temperatures, even if needed, some of the aggregate is probably being heated to excess, perhaps with injury as well as expense. Temperature requirements as high as 425° have been mentioned. In our view something is wrong when such levels are indicated as being required, but we don't believe the aggregate is necessarily at fault.

We cannot claim to be an expert in this field but we are struck by the difference in apparent knowledge concerning drying between highway engineers and their brethren in the chemical industries. To the latter, drying is one of their numerous "unit operations," concerning which specialized information has been developed. The variables affecting such operations have been pointed out, their interrelationship more or less evaluated. In any specific problem the particular factors controlling the desired objective are given consideration, with the process and controls set for this end.

### Chemical Industry Compared

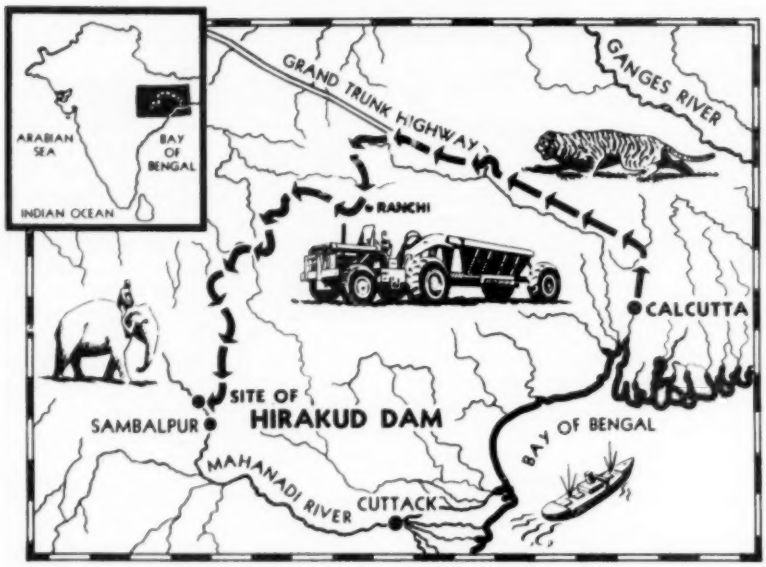
In highway work the tendency seems to be to set an arbitrary moisture limit for all work, and on the job to raise the dried aggregate temperature until the requirement is met, with perhaps an overheated mix or other undesirable consequence accepted as a necessary evil. We have had some contact with drier problems in the field, and we have never heard either the moisture limit (as a technical necessity) questioned or the drier manufacturer—who presumably knows quite a little about it—called in to see if the equipment was being operated to best suit the conditions.

This does not mean that specification requirements should be thrown overboard at the first sign of trouble, particularly in the case of plants in which all the other equipment capacity has been stepped up beyond that of the drier; nor can unreasonable drying demands be met by some magic on the part of the maker. But we do think that the drying requirements and the process of meeting them should be recognized as a problem which requires judgment and consideration of the local factors, rather than a set, and perhaps oversimplified, procedure.

As to the need for greater recognition of the dangers to bituminous mats—particularly other than hot mix—from moisture before, during, and after construction, that is another matter, and a lengthy one. We hope to find opportunity to comment on it from time to time. Meanwhile we suggest that the younger engineers consult the old timers on such problems. These problems were the principal topic of conversation some twenty years ago more or less, and both the difficulties and the cures were rather thoroughly talked over. However, the procedures which took care of them seem to be occasionally forgotten nowadays, sometimes to the dismay and perplexity of those responsible for the work.

# Trek Through Indian Jungles

*How trained and organized personnel of Indians, Europeans and Americans took a fleet of 22-ton earth wagons 600 miles overland to Hirakud dam site—NOT "without incident."*




★ How heavy equipment made the 600-mile journey

ANCIENT armies once traveled the highways of India with their war elephants. A caravan no less strange left Calcutta at midnight, December 14, 1951. It was composed of 22-ton earthmoving machines, each with the power of more than five good Indian elephants.

Ahead lay a journey through jungles and the treacherous sand of river bottoms, over narrow bridges and mountain roads.

Objective was the site of Hirakud Dam near Sambalpur, State of Orissa. This dam will be the first of three major ones on the Mahanada River, which has often brought flood or famine in its course southeastward through Orissa to a delta on the Bay of Bengal. In addition to flood control, the dams will provide electric power, navigation, silt control, irrigation, soil conservation and other facilities.

The machines were comprised of 16 Caterpillar DW20 Tractors with W20 Wagons. Faced with the problem of delivering these hugh earthmovers, A. R. P. Ramsey, director of Tractors (India) Limited, decided upon the method and route. There could be little delay. Delivery by December 31, 1951, was specified by the Director General of Industry & Supply in Delhi. Preparations were speeded when the machines arrived by ship in Calcutta early that month.

### Factory-trained Guide

On hand to supervise the operation and servicing of equipment was Oscar Neunhoffer, a Caterpillar field engineer. Mr. Neunhoffer had received special factory training on the earthmovers. When he returned to his territory his job was to supervise delivery and put the machines to work. Since he was to remain in the territory, his advice would continue to be available.

Meanwhile, Mr. Ramsay scouted the proposed route in a jeep. He found the road distance from Calcutta to Hirakud to be about 600 miles. Although his jeep moved over good macadam roads the first 300 miles, he noted that many bridges along the way were limited to an 8-ton gross load. He drove his jeep the remaining 300 miles through wild country over dirt roads, with many timber bridges limited to 3 tons. Where bridges were not strong enough, the caravan would have to leave the road and ford the streams —possible during the dry season at hand.

Such was the prospect when the 16 machines were driven from Calcutta December 14. The journey began at midnight when the city transport ceased to operate. Traveling conditions were good, and the caravan moved 193 miles during the first 18 hours.

★ Fording a very soft riverbed—the Damodar River at Ramgarh, before which most of the caravan is shown waiting to cross. This crossing was made without the use of matting but with the aid of a 400-foot towline

★ Will he make it? This railway bridge imposed a tight fit, allowing about one inch of clearance at the front corners of the wagons in the middle of the arch. All machines safely passed this obstacle 130 miles from Calcutta

★ Before departing with the caravan: A. R. P. Ramsay and C. W. Porter, directors of Tractors (India) Limited; Oscar Neunhoffer, Caterpillar field engineer; A. K. Mitra, dealer sales engineer; Messrs. Auddy, Ramdhin, Paul and Smith, tractor operator-mechanics; and Service Engineer T. Manuel and Service Manager J. C. Waymark of the dealership

First major obstacle was the Damodar River at Ramgar, where the bridge had an 8-ton limit. The men drove their units down the steep bank without difficulty, but the stream bed itself consisted of soft, silty material. One unit made the difficult crossing under its own power. Then the second unit hit a soft spot and bogged down. Operations were suspended at darkness.

Early next morning, the machine which had successfully crossed was used to free the second unit by means of a 400-foot line of ¾-inch tow rope. Thereafter, the men laid perforated steel matting on the river bed and drove the remaining 14 machines across with little difficulty. Five tons of this airport matting were carried in the wagons for just such an emergency.

### First 330 Miles

At noon the same day, the machines were halted at Ranchi, summer capital of the State of Bihar at elevation 2,000 feet. Just 2½ days had elapsed and Calcutta lay 330 miles behind. For the operators and mechanics it was time to refuel. In addition to the 80 Imperial gallons of diesel fuel in each tractor tank, the wagons carried in drums a total of 3,700 Imperial gallons. After refueling the men took a needed rest.

Sunrise introduced the fourth day with its new obstacles—bridges which, although strong enough, allowed only about three inches of clearance on either side of the wagon wheels. These bridges were crossed carefully at 4 mph. Otherwise, the road from Ranchi was tar macadam and completely free of traffic, so that excellent time was made up to the Sankhe River which forms a boundary between Bihar and the Central Provinces.

There the stream was 300 yards wide but only about a foot deep. This foot of water covered very treacherous sand, and suspicions were confirmed when the initial attempt at crossing was successful only for about 30 yards. Attempts to push the machine failed. For eight hours the men wrestled steel matting into place before the caravan could reach the far bank. That night 22 exhausted men slept in a small rest bungalow nearby.

The sleep of Oscar Neunhoffer and A. P. R. Ramsay, still supervising the convoy, must have been disturbed by their recent knowledge of another incident. A woman had dashed across the main street of Ranchi after her child and had crossed the path of Machine No. 14. The operator had quickly applied the air brakes. His machine had stopped immediately—but the last two operators, traveling in the very tight convoy needed to pass rapidly through villages, were unable to avoid bumping their machines up again his. As a result of the shocking impacts, flywheel housings on all three tractors had been cracked. Even so, all three units had completed the day's journey and made the crossing.

### More Troubles

So, morning came with its new problem of transporting these three damaged machines. No. 16 was the most badly damaged and by this time its clutch would not disengage. Towing was attempted but abandoned after 20 miles because of hilly and dusty conditions. The three continued under their own power. Eventually, however, No. 16 had to be left temporarily at a mission along the route.

Still another acident was to confront the hard-working crew. The caravan had ascended into mountainous country near Chota Nagpur, following a narrow and twisting road. All of the many timber bridges in this area made diversions necessary. One such bridge was hidden to the operator of the leading machine until he rounded a bend and bore down upon it. The bridge collapsed, and the machine plummeted down the side of a ravine. Fortunately for both the operator and his machine, it did not overturn but lodged down the slope behind two rocks.

A diversion was found through an adjacent jungle area for the other tractor-wagons. Two of the drivers maneuvered their machines above the one stranded in the ravine. Others joined in the work, alert to the threat of a maneating tiger reported to be in the vicinity. Another hard day's work resulted in recovery of the stranded machine after a new bridge had been built under it. No serious damage was found.

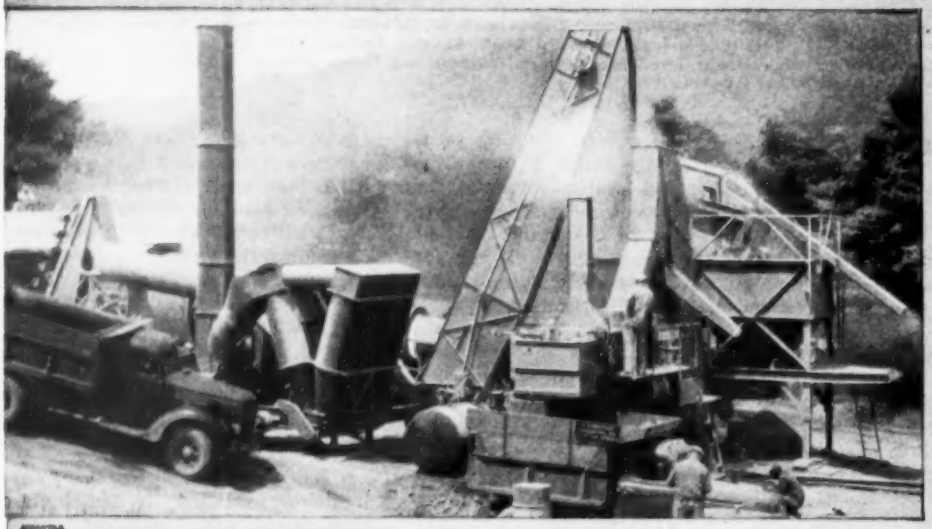
Leaders of the convoy then took time to consider the job that remained. Seven days had passed. They were still 110 miles from their destination. Considering these facts, they decided to leave damaged No. 16 along with three sound tractor-wagons at Kunkuri Mission, a remote Jesuit establishment along the route. The other 12 units then might finish the journey to Hirakud Dam before the December 31 deadline.

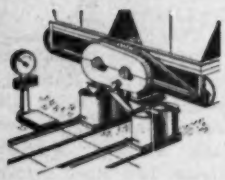
This was done. In three days, the 12 remaining machines covered the rest of the distance, making 35 diversions—some of which caused no delay and others holding the machines up as much as eight hours. At 8 p.m. on December 23, nine days after leaving Calcutta, the convoy—minus four units—arrived at Hirakud. Officials of the Government In-

*(Continued on page 96)*

# Barber-

## BITUMINOUS MIXING PLANTS





**Mix sampling and calibration facilities provided on B-G High Capacity Plants for mixing highest type 3-and-4 aggregate mixes. Convenient, accurate calibration by weight.**

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**GRADATION UNIT SCREEN** and bin design permit separation of aggregate into 2, 3 or 4 fractions to meet any specifications.

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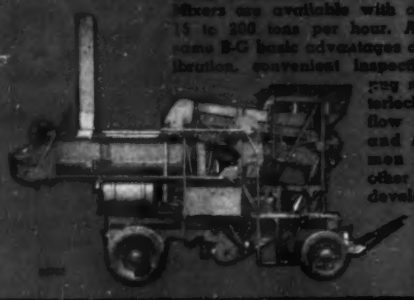
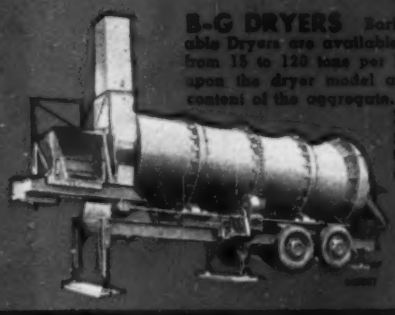


**B-G MIXERS** Barber-Greene Portable Mixers are available with capacities from 15 to 200 tons per hour. All feature the same B-G basic advantages of accurate calibration, convenient inspection, twin-shaft pug mill mixing, interlocked continuous flow of aggregates and metered bitumen supply, and other exclusive B-G developments.



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**B-G DUST COLLECTORS** Barber-Greene Portable Dust Collectors are available in sizes to meet every requirement for dust control and plant output. Screw conveyor re-

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*Complete files of performance data and explanatory literature on the size and type of Barber-Greene Mixing Plant which interests you are available at your request. As a preliminary to thorough discussion of your needs with Barber-Greene experts, send for this information. When writing, specify type of mixes, plant output, etc.*

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★ Additional rolling. Note ring rollers and light broom drag

★ Compacted base. Weight 142 pounds per cubic foot

## New Flexible Pavement

*(Continued from page 80)*

a stockpile of soil sufficient for one or two days of operation, under waterproof covers. This material being used when work was resumed immediately following rains.

### Problem of Fines

The availability of satisfactory fine material for producing the stabilized aggregate base course will present a problem in some cases. Should it become necessary to use a plastic material for the added fines, it would be necessary to have the soil thoroughly dry and to use some equipment such as a hammer mill for pulverizing it before mixing with the coarse aggregate. There is also a considerable cost involved in obtaining and setting up the necessary equipment for the processing and mixing of the materials. This cost might be prohibitive for the construction of a small project.

The advantages to the contractor under this method will offset to a large extent the disadvantages. It is believed that this type construction will accomplish the purpose of eliminating road mixing, the adding of water on the road, and a great deal of the blading and shaping previously necessary.

The bid price for the 14-in. compacted thickness of base course on the project on U S Route 29 was $1.91 per sq. yd. with a price of $0.33 per sq. yd. for the bituminous surface treatment.

Contracts have been let for three other projects using 14 in. of this type base material. These prices ran from $1.60 to $2.10 per sq. yd., the higher figure being for a project where only 90,000 sq. yd. of base material was involved.

The Highway Commission now has under contract 43.8 miles of this type of construction and plans are being prepared for 32.6 additional miles.

*Legal*

# No Obligation To Provide Detour

***By Albert Woodruff Gray***

The performances of a contract by the United Foundation Company in a flood control project at Ridgeley, West Virginia, required an excavation in one of the streets in that town.

The street was made impassable and as no detour for pedestrians was provided by the contractor they were forced to travel around the excavation as best they could over a "muddy, slippery and rocky path," lacking any illumination at night.

One pedestrian using this detour during the night slipped and fell and sued for damages for the injuries suffered from what she claimed to be the negligence of the contractor.

A municipal corporation is charged, said the court, with an absolute duty to keep and maintain its streets in a reasonably safe condition for use by the public. It may however authorize temporary obstruction of its streets for such purposes as repair or improvement or the construction or improvement of adjacent properties. It is the duty of the municipality or the contractor or the owner of adjacent properties however, to give warning.

"We find no authority however," continued the court, "justifying the conclusion that in addition to the duty of a contractor to warn of such an obstruction by lights, barriers or other appropriate means, there is also a duty to provide a temporary way or detour around the obstruction."

"In none of the authorities did we find any further duty imposed upon a contractor than to warn of the existence of the obstruction. In some instances the providing of a temporary way or detour would be impossible of performance, as where a street is completely obstructed between buildings or other improvements on adjacent properties, or where no way can be obtained over private property."

"In many circumstances the cost of providing such a way or detour would be prohibitive and prevent or delay needed repairs or improvements on the streets. In practically every case the cost of such repairs or improvements would be increased at public expense. Under such circumstances public necessity requires that no such duty should be imposed upon the contractor. Individual inconveniences must give way to public conveniences and necessity."

**REFERENCES**

Nester v. United Foundation Corp., 67 S.E. 2d 533, West Virginia, November 13, 1951.

## Be alert for these unusual blasting hazards

*(Courtesy "Field Flashes," News Letter, Construction Section, National Safety Council, James A. Shaw, Editor)*

THE use of explosives on construction jobs nowadays is quite common. The subject of safe handling of explosives is everchanging, because of new developments in explosive and blasting techniques. Every year many men are seriously injured and several are killed through improper usage or lack of knowledge of the characteristics of explosives.

This article is not intended to be a complete coverage of all the unusual blasting hazards. However, there are several that will be covered briefly for the purpose of pointing out certain hazards that exist. If these hazards exist on your job it would be well to go into the subject in detail so that complete understanding of the hazards involved and of the recommended control on the hazards is understood by the men handling these explosives.

### Lightning

We know that if lightning strikes a blasting circuit detonation will result. There are no precautions that can be taken which can prevent the detonation from a direct lightning strike. In all probability a near miss from lightning will also cause detonation.

The thing that is not usually recognized on construction jobs is that blasting circuits can be detonated by lightning striking several miles away. There are many factors which enter into the probability of detonation according to distance of the lightning. But it can be said that anything that conducts electricity, such as fences, power lines or even water, will increase the probability of detonation of a blasting circuit.

There have been several methods devised which were supposed to render electric blasting caps insensitive to lightning, but none of these methods have proved to be fool proof. Many authorities feel that the minimum safe distance between an electrical storm and blasting circuits with electric blasting caps is five miles. In other words there is always the danger of detonation of an electric blasting circuit if an electrical storm approaches within five miles of the circuit.

Means of determining a level of


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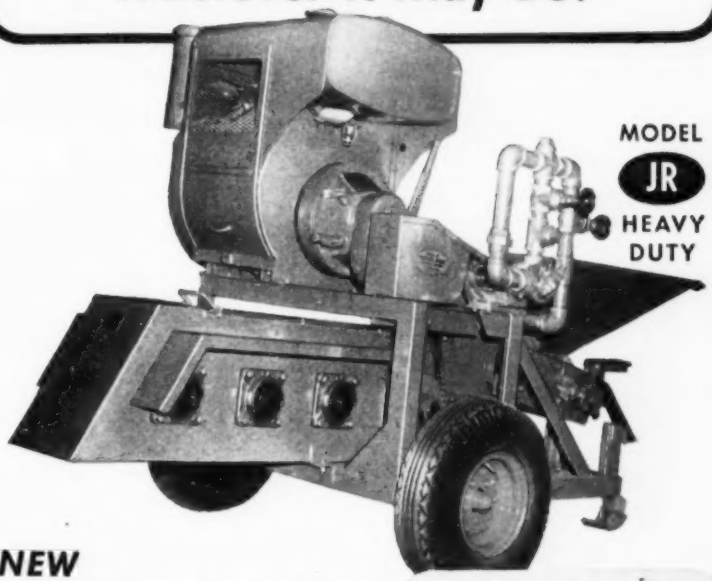


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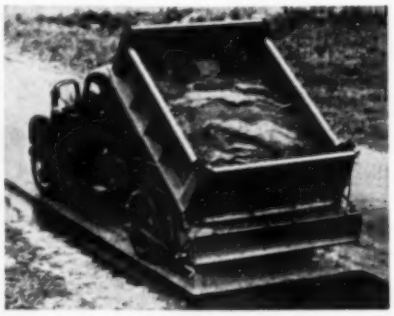

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static produced by an electrical storm are still quite rough. However, it might be well to keep in mind that the audible limit of thunder is around seven miles. If lightning flashes are seen and then the thunder following each flash can be distinctly heard, the limit of safety is approaching rapidly.

### Radio Hazards

There is an increasing use of portable radio transmitters on construction jobs. Other types of radio transmitters are frequently near the job such as police transmitters, amateur radio transmitters and even commercial broadcasting transmitters.

It has been established by actual test that electric blasting caps can be exploded by radio waves. It is true that conditions have to be just right but enough serious accidents have occurred to warrant full consideration of this unusual blasting hazard.

The true hazard is created by radio transmitting sets and not by receiving. The wires for electric blasting caps act as an antenna to pick up the transmitted radio waves. If conditions are just right, the cap can be exploded from these waves. The unusual part of this problem is that the length of wire to the blasting cap is very important. There is a definite ratio between the length of wire on a cap and the transmitted wave lengths. In other words blasting can be done in a dangerous radio field for some time before the right conditions are reached. However, when the conditions are reached a premature detonation will occur.

The amount of radio frequency current will vary directly with the power of the transmitter and inversely with the distance from the transmitter. In other words the transmitter of 50,000 watts would have a danger area of 10,000 feet while a transmitter of 30 watts would have a danger area of only 100 feet. If blasting is to be done in an area which is dangerous because of permanent radio transmitters it is recommended that the blast not be detonated with electric blasting caps. In areas where portable transmitters such as those used on construction jobs are located, it may be possible to control the hazards by controlling the use of the transmitter.

If blasting operations are to be carried on in an area in which there is known radio transmitting equipment the entire problem should be studied very thoroughly before electric blasting caps are used.

### Static Electricity

It is a known fact that static electricity can detonate blasting caps. Static electricity can be generated by many sources on construction jobs. Moving belts, escaping steam, open electrical connections, and even revolving automobile tires can cause enough static energy to detonate

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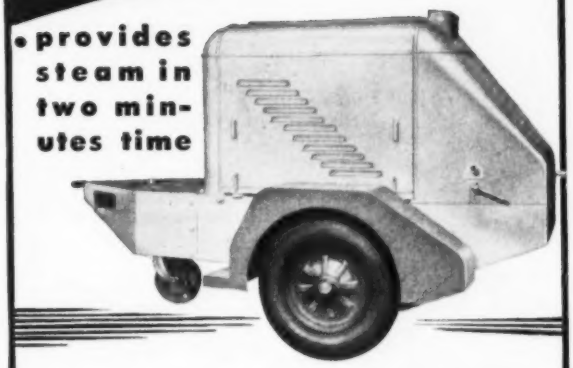
• provides steam in two minutes time



With a Littleford "Tankar" Steam Heater you can heat a tank car of Asphalt, Tar, Pitch, Cutback or Emulsion in 1/3 less time than ordinary units. It's a proven fact that this Littleford unit produces Steam in 2 Minutes from a cold start. There's no delay getting up steam for your unloading job.

This completely packaged Steam Heater is the most modern unit ever offered to the Construction Industry. It can maintain any predertermined steam pressure from 75 200 lbs. automatically. It contains all the water, fuel and gas to operate in the most efficient manner. A Steam engineer is not required to operate it. Being light weight and perfectly balanced, the "Tankar" Steam Heater is easy to maneuver when on the job and easy to transport at High speed. Write for Bulletin No. 21 for details.

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blasting caps. In the open country dust storms can generate heavy charges of static electricity. There have been several accidents caused by premature detonation of electric blasting caps during severe dust storms.

These hazards can be controlled by the use of common sense. Moving machinery near blasting operations should be adequately grounded. In blasting, wires should be kept away from piping, rails, or other wiring which might convey charges. Blasting should not be carried on during severe dust storms.

If it is suspected that static electricity is present near blasting operations, the entire subject should be studied in detail.

### Stray Currents

In tunnel work the hazard of stray electric currents is present. Many accidents have occurred in mines which can be traced directly to stray currents entering the blasting circuit and firing caps. Stray currents are common around pipelines, rails, armoured cables, and ventilating ducts. There is also a possibility of stray currents in the ground from poor power line insulation.

In operations involving tunnel work and other operations which might involve stray currents, frequent tests should be made with suitable instruments for determining the presence or absence of such currents.

### General Remarks

The purpose of this article was to point out some of the unusual conditions which have caused trouble in the use of explosives on construction jobs. The "Blasters' Handbook" and most of your large explosive supplying companies will be glad to furnish more detailed information on the hazards. The average blasting foreman on a construction job cannot be expected to be an expert on all phases of these unusual hazards. It is therefore recommended that if one of the above unusual blasting hazards is present on your job that outside advice be obtained immediately before a serious accident results.


How the

MOTO-PAVER

View of S. George St., Rome, showing one "slab" laid against the far curb.

The completed resurfacing job—a smooth, waveless surface.

Cut Resurfacing Costs in Rome (N. Y.)

Shown above are before and after views of a recent street resurfacing program in Rome, N. Y., in which a H & B Moto-Paver was used. This program involved a total of 2.47 miles, at an average cost of 52c per sq. yard, including all materials, labor and equipment rental costs. (Approximately 60 days after the paving was completed, a light seal coat was applied. Cost of this seal coat was not included in the 52c.)

*Moto-Paver* does the complete mixing and laying job—in one continuous operation. As shown here, it produces a smooth, waveless surface—even on rough, rutty and irregular pavements. Road speeds up to 25 mph. make possible quick moves from job to job. *Moto-Paver* gives a uniform mix using beach sand, gravel, crushed stone or slag aggregates, and tars, cutback asphalts, road oils, emulsions or other bituminous materials.

For specifications and further information see your local H & B distributor or write for Bulletin MP 49.

H&B ESTABLISHED 1867

HETHERINGTON & BERNER INC.

*Engineers—Manufacturers*

721 Kentucky Ave. Indianapolis 7, Indiana


## Trek through jungle

*(Continued from page 89)*

specting Authority inspected and accepted these delivered units the next day.

### Trip Concluded

A party of five, consisting of Mr. Neunhoffer and Messrs. Ramsay, Waymark, Smith and Ramhdin of Tractors (India) Limited, proceeded back to Kunkuri Mission December 27 to pick up the rest of the order. Using experience gained with the previous convoy of 12, this group reached Hirakud in less than two days. No. 16 finished the trip despite its damages. Mr. Ramsay commented:

"All gear changing was done without the use of the clutch and it is reckoned that Tractors (India) Limited now have on their staff one of the finest DW20 gear-shifters in existence today!"

The last four machines arrived December 28, beating the deadline by three days. Mr. Neunhoffer proceeded to direct repairs of the cracked housings and prepared to start schools for operators and maintenance personnel on January 4.

Thus was concluded the delivery of 16 Cat earthmovers to Hirakud Dam. The Hirakud project has been estimated to cost 478 million rupees (or nearly $100 million) at 1946 prices. Fulfillment of current plans is expected within the next ten years, during which time the construction will proceed by stages to further the economic development of the Republic of India. The pioneering spirit displayed by India citizens with the caravan indicates that these plans were made on good grounds.

## General Motors contest bringing many inquiries

General Motors Corporation Better Highways essay contest, announced early in the winter, has brought a flood of mail to this company. The Detroit central office of the contest alone had received about 25,000 pieces of mail from the contest—mostly requests for entry blanks—up to the end of December.

According to a spokesman for the company, there is a very high interest in the contest on the part of engineers and other experts in the highway field. In some cases it appears that groups of engineers may be working as a team in preparing entries, although entries under the contest rules must be entered in the name of an individual. Many calls have come in for the highway fact book published to help contestants.

Highway engineering and contracting people are discussing the contest widely. Those individuals close to the road building problem are aware of the complexity of the highway need and the difficulty of proposing a workable solution for either the national level or for any one state's highway situation. Very elaborate data costing hundreds of thousands of dollars to compile are conceived to be necessary by such organizations as the Automotive Safety Foundation in approaching the highway needs problem of any state. The General Motors contest officials, however, have stressed the importance of ideas, which does not necessarily require implementing with large masses of factual data often not available to an individual.

## Stereo photography speeds surveys for N. J. Parkway

Engineers engaged in the advance engineering for the $285 million Garden State Parkway, soon to be constructed in New Jersey, are making fullest use of aerial photography as a mapping, locating and surveying aid. Under the direction of Theodore Spawn, Jr., this work is taking the place of slow, laborious ground surveys in many phases.

First step was to photograph a 2,000-ft. wide strip along the projected route, which traverses the Jersey metropolitan area and extends south to Cape May. Overlapping stereophotos made possible the creation of contour or 3-dimensional maps, from which the best location could be obtained to take advantage of the terrain. A model of the highway was constructed from these maps, using cardboard sections fitted together like a jig-saw puzzle, the 2,000-ft. width being represented by a width of 20 inches.


IN *ONE* MINUTE . . .

loaded by *Athey* Hi Loader

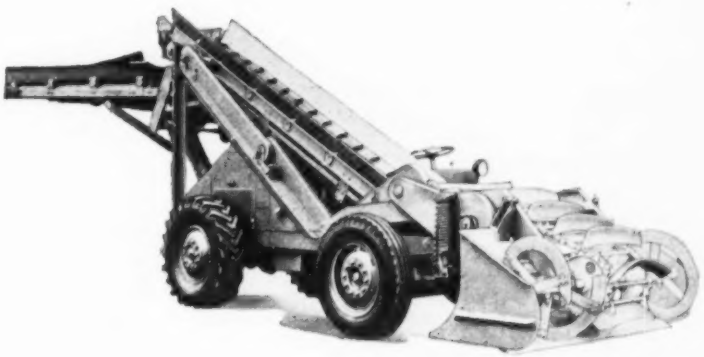
Sand, snow, stone or soil—whatever material you move will get the fastest handling you've ever seen with an Athey 125 Hi Loader!

This versatile rig — built with a ruggedness that assures trouble-free service — digs in at speeds up to 2 MPH. Hi-Carbon Steel feeder blades — fed by augers that reach out four feet from center — paddle the material onto the heavy-duty cleated conveyor belt. Feeder blades and augers float freely to ride up and over piles — eliminating slow-downs caused by jamming, crushing, bulldozing.

Material moves up the conveyor and onto the discharge conveyor that is hydraulically controlled to swing to either side. Height of discharge is adjustable to fit hauling units of *any* size. The Hi Loader moves from job to job at speeds up to 20 MPH.

Here is the portable loader . . . a conveyor . . . material handler that can speed your operations and cut your costs. It's backed by your Athey-Caterpillar Dealer who can give you all the profitable facts. Call on him today!

ATHEY PRODUCTS CORPORATION, 5631 West 65th Street, Chicago 38, Illinois



*Athey* Hi Loader

Athey Products Corporation, Dept. RS 2
5631 West 65th Street
Chicago 38, Illinois

Please rush me more information on the fast-loading Athey Hi Loader. I am in the _____ business.

NAME _____

ADDRESS _____

CITY _____ STATE _____

MAIL THIS COUPON — TODAY!

P&H SINGLE PASS STABILIZERS

# what the P&H method means to engineers!

P&H Stabilizers are built in 5, 8 and 10-foot processing widths.

Now, soil stabilization has become an *exact science.* The P&H Soil Stabilizer gives you such *complete* quality control every step of the way that you can *pre-determine* load-carrying strength . . . and be sure of it!

In addition, the P&H Stabilizer offers these big advantages to road engineers and builders:

**lower material costs!**

The P&H Stabilizer makes more effective use of bituminous liquids, cement and water . . . saves on all three counts!

BITUMEN costs lowered! Rapid mixing, before liquids can cool, permits use of heavier grades of cut-back asphalt *than by any other method!* Savings with asphalt two grades heavier exceed $500 per mile on a 20′ roadway at 6″ depth!

CEMENT goes further! Accuracy and processing speed obtain maximum benefit of added cement through rapid mixing and compaction. No need for extra cement as with ordinary methods. This P&H advantage alone can save $500 per mile!

*These facts and figures can be proved!* If you plan stabilized roads, base courses, airports, of soil-cement, soil-bituminous or clay-gravel, see how it actually costs less, for the better quality you get with the P&H Single Pass Stabilizer. Get Bulletin S-8.

WATER is conserved because complete mixing takes place immediately after full water application, thereby minimizing loss by evaporation.

**eliminates need for extra road width!**

The extra ½ to 1 foot usually required to compensate for faulty or irregular base edges, is saved. The P&H Stabilizer produces edges of same depth and quality as the rest of the base. This cuts yardage, saves up to $450 per mile on many jobs.

**less personnel**

With the P&H Stabilizer, all work is concentrated in a smaller area. Fewer men are needed. Moreover, its greater speed permits faster job completions; limited personnel handles more miles of work per season.

P&H SINGLE PASS STABILIZERS

HARNISCHFEGER CORPORATION

4400 W. National Avenue, Milwaukee 46, Wisconsin

Postage Will be Paid by Addressee

No Postage Stamp Necessary If Mailed in the United States

**BUSINESS REPLY CARD**

First Class Permit No. 52, Sec. 34.9, P. L. & R., Chicago, Ill.

**ROADS AND STREETS**

22 WEST MAPLE STREET

CHICAGO 10, ILLINOIS

Postage Will be Paid by Addressee

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22 WEST MAPLE STREET

CHICAGO 10, ILLINOIS

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My Firm or Govt. Dept. _____

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Send me more new equipment information on items circled:

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| 121 | 122 | 123 | 124 | 125 | 126 | 127 | 128 | 129 | 130 | 131 | 132 | 133 | 134 | 135 | 136 | 137 | 138 | 139 | 140 |

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2/53 R&S

★ Scraper "shovel mix" method was used to advantage here by a brick manufacturing company in Texas. Two C Tournapull-Scrapers loaded down grade to pick up and mix different types of clay. Then haul it directly to the hopper that supplies the manufacturing plant. The scraper also permits "Selective Loading," i.e., obtain "shovel mix" loads by starting the load in one area—stopping, when the body is partially full—and speeding to another section to finish loading with a different or blending type of material

★ Shown here are two model A Tournapull-Scrapers loading 27 cubic yards down grade to thoroughly mix materials and obtain "shovel mix" loads; Oahe Dam at Pierre, South Dakota

# Use of Scrapers for "Shovel-Mix"

**By J. W. Gulledge**

Field Engineer
R. G. LeTourneau Company

TO obtain a desirable or usable material for fills it is often necessary to unify several types of material lying in horizontal strata. Shovel buckets working up through the strata will obtain a cross-section of the material lying in this manner, and so mix it that slightly undesirable material will be mixed with highly desirable material to give a finished product satisfactory for all compaction requirements. Contracts often call for a "shovel mix" to obtain this feature.

By properly controlling the cut, a Tournapull-Scraper can work down through these same strata and develop a more accurate mixture than by any other method. In addition to being able to graduate slopes to obtain as much of a certain classification as desired, there is the opportunity of eliminating any undesirable stratum; or spot segregation may be made without loss of operating time or yardage.

The mixture of material picked up in this manner is assured by two things. Firstly, mixture is obtained by boiling action of the material in the scraper bowl. Here, new material in the bowl is in constant action and is actually forced up through the previously loaded dirt and becomes a part of it.

Secondly, a mixture is further created in the spreading process. All material must pass under the scraper blade during the spread. The material is carried in the front of the bowl until it rolls under the blade. This creates a rolling action such as is obtained by a bulldozer or grader blade in spreading, and thoroughly mixes the material.

To obtain the mix a scraper simply loads down grade across the face of the various strata, starting and finishing its load at such points as include or exclude any given material, and establishing the grade which gives the required proportions.

Down grade loading in itself is an advantage in scraper work and is recommended as a general procedure wherever possible.

One of the most exacting engineering groups concerned with the construction of earthfill dams in the United States is the U. S. Bureau of Reclamation. It has maintained a strict surveillance of all material going to earthfill dams, where the proper segregation, moisture content, and mixture of material is probably more important than in other types of embankments.

Several years ago, recognizing the rapid advancement in the use of scrapers and their type of work, reclamation engineers agreed to make a test of a typical pit, to be chosen by themselves to establish whether or not scrapers would give the equivalent of "shovel-mix."

The results obtained showed that scrapers could be successfully used on general excavation to obtain the equivalent of "shovel mix" material.

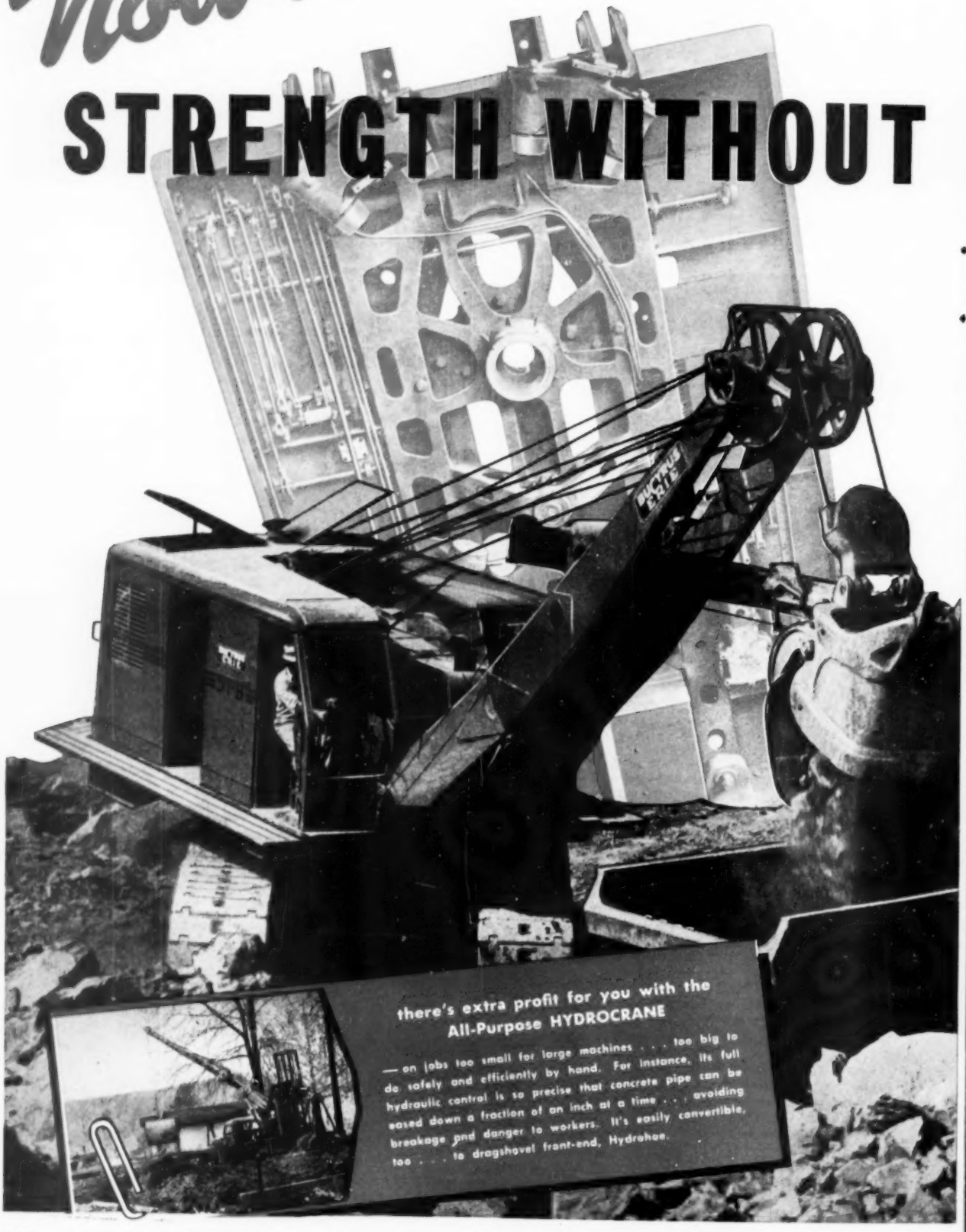
In the years following this test, the use of scrapers to obtain "shovel mix" has become increasingly popular and generally accepted by the majority of U. S. construction bodies.

## H. W. Morrison Honored by M-K Associates

★ H. W. Morrison, founder and president of Morrison-Knudsen Company, Inc., was recently honored by the presentation of a bronze plaque, in commemoration of his 40th anniversary in the company's service. Photo of Mr. and Mrs. Morrison taken at the ceremony, in which the spotlight was also focussed on the 536 M-K employes who have served the company 10 to 30 years or longer

*Now . . .*

# STRENGTH WITHOUT



**there's extra profit for you with the All-Purpose HYDROCRANE**

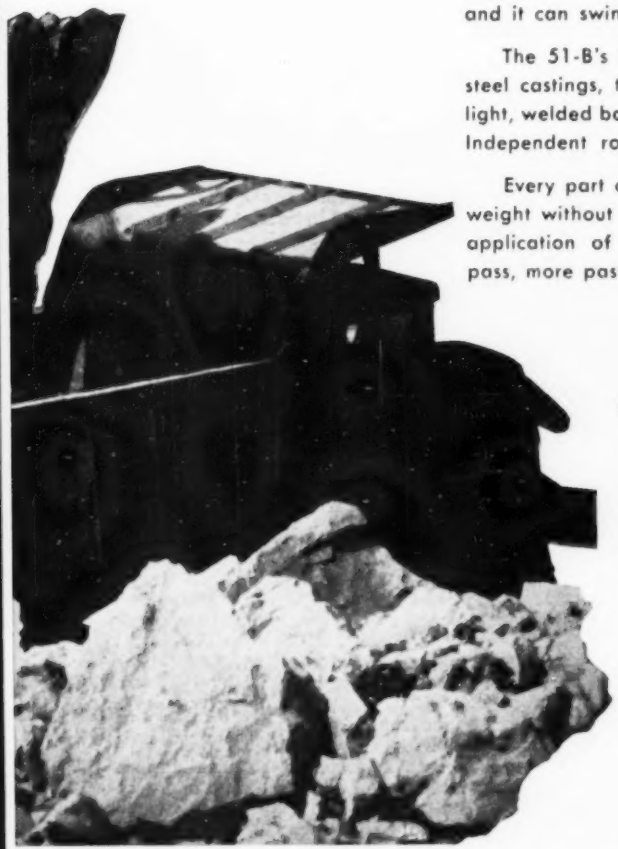
— on jobs too small for large machines . . . too big to do safely and efficiently by hand. For instance, its full hydraulic control is so precise that concrete pipe can be eased down a fraction of an inch at a time . . . avoiding breakage and danger to workers. It's easily convertible, too . . . to dragshovel front-end, Hydrohoe.

# DEADWEIGHT . . .

## *counts more than ever*

## and it's yours with Bucyrus-Erie's 2-yd. 51-B

3/8 to 4-yd. Gasoline, Diesel, Electric Excavators



HERE'S an excavator that combines built-in durability with weight economy to give bigger output with less maintenance.

For instance, the 51-B's revolving frame is a single box-section casting of annealed steel . . . specially developed and cast by Bucyrus-Erie. This solid "backbone" provides real rigidity for machinery alignment — yet holds weight to a minimum. As a result, vibration is minimized in the 51-B . . . and it can swing fast, work at a profit-building pace.

The 51-B's truck frame and caterpillar side frames are single annealed steel castings, too — for strength with light weight. Boom and handle are light, welded box-sections that provide ample strength for all working stresses. Independent rope crowd eliminates the need for heavy boom machinery.

Every part of the 51-B reflects advanced engineering that cuts out dead weight without compromising strength. This means you get most economical application of power and lowest upkeep — with bigger payloads every pass, more passes every day. 66E52C

BUCYRUS ERIE

SOUTH MILWAUKEE, WISCONSIN

*Most Compared*
*Most Preferred*

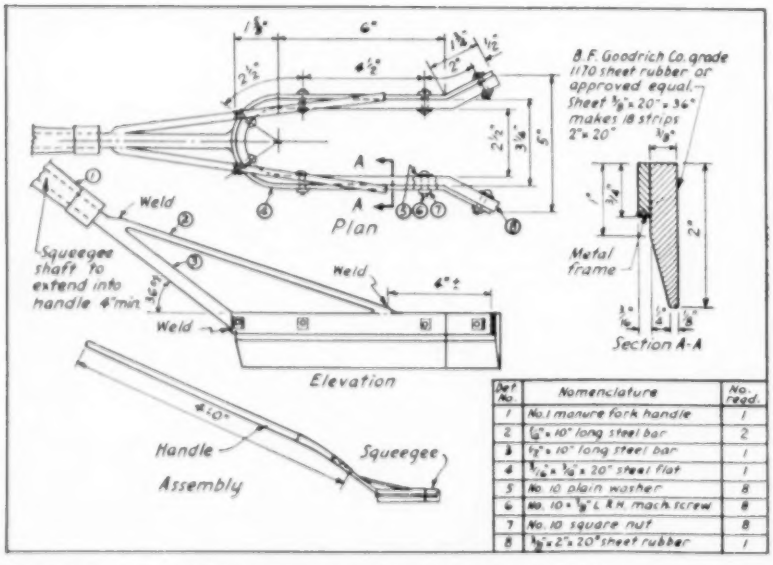
★ How the squeegee looks as built in accordance with the accompanying detail sheet

## Details of joint squeegee developed by Minnesota maintenance engineers

In the November, 1952, issue of Roads and Streets an account was published of a very effective maintenance tool developed by the maintenance personnel of the Minnesota State Department of Highways. This is a squeegee used to remove excess poured joint filler material immediately behind the pouring can.

The device not only cuts the amount of bituminous material used for concrete pavement maintenance to about one-third of that formerly required, but it has also helped do a better job by eliminating bumps and extrusions.

For the benefit of readers who might want to build such a tool we reproduce on this page a sketch of the details. This sketch was supplied through the courtesy of M. L. Jones, district maintenance engineer, and C. L. Motl, maintenance engineer, Minnesota Department of Highways.


B.F. Goodrich Co. grade 1110 sheet rubber or approved equal. Sheet 3/8" x 20" x 36" makes 18 strips 2" x 20"
Plan
Weld
Squeegee shaft to extend into handle 4" min
Elevation
Handle Assembly
Squeegee
Metal frame
Section A-A

| Def. No. | Nomenclature | No. req. |
|---|---|---|
| 1 | No. 1 manure fork handle | 1 |
| 2 | 5/8" x 10" long steel bar | 2 |
| 3 | 1/2" x 10" long steel bar | 1 |
| 4 | 3/16" x 3/8" x 20" steel flat | 1 |
| 5 | No. 10 plain washer | 8 |
| 6 | No. 10 x 3/8" L.H. mach. screw | 8 |
| 7 | No. 10 square nut | 8 |
| 8 | 3/8" x 2" x 20" sheet rubber | 1 |

★ Detail sheet for crack filler squeegee, Minnesota state department of highways

## New radio band available for short range use

The Federal Communications Commission recently announced its first specific FCC Class "A" Citizen's Band type approval on mobile and base station radio equipment for operation in the 460-470 Mc. frequency band. The FCC approval is for any mobile and base station equipment similar to that manufactured by Motorola, Inc., of Chicago. FCC Type Approval Nos. CR-406 and CR-407 applies to Motorola mobile radio model T44A and base station model L44A, respectively.

As defined by the FCC, Class "A" operation is within the frequency range from 460 to 462 Mc. and from 468 to 470 Mc. and is limited to a transmitter final amplifier power input of 50 watts. Class "B" operation extends from 462 to 486 Mc. and is restricted to a 10-watt power input.

Approval of this equipment, the first and to date the only approval granted by the FCC, opens new channels to all individuals, public agencies and commercial enterprises who need two-way radio and who were previously ineligible because of FCC regulations. Previously, two-way radio operation was restricted to the 25-50 Mc. and 152-174 Mc. bands. Because of the tremendous traffic demands in these bands, operation was reserved chiefly for users in the land transportation, public safety, and industrial and domestic public services.

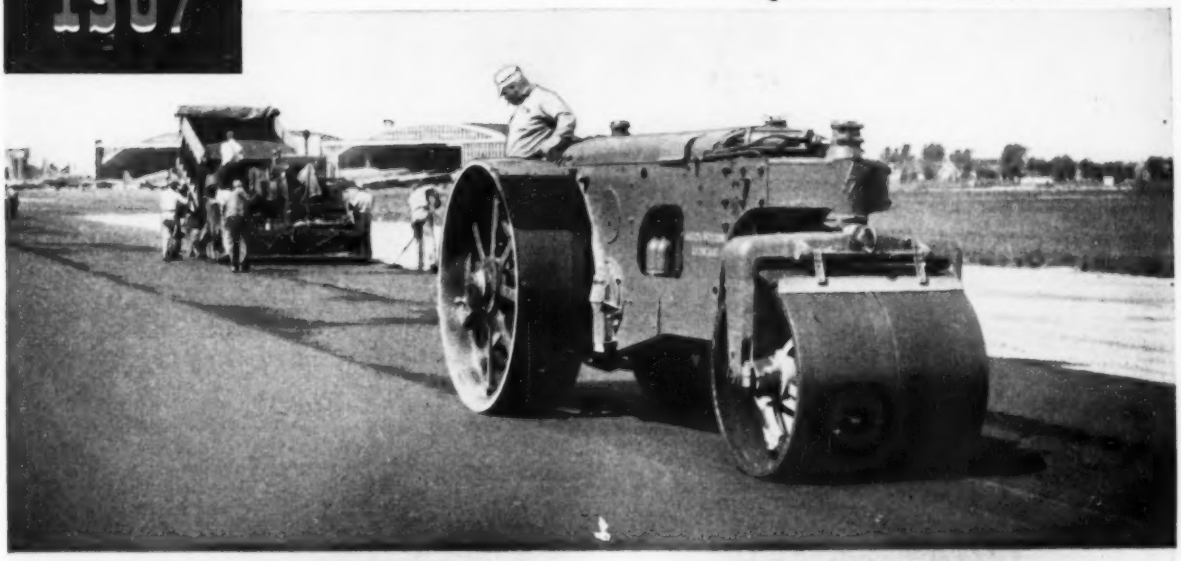
The mobile and base station equipment, bearing the FCC stamp of approval, incorporates many of the same features included in the manufacturer's equipment operating in the lower frequency bands. The receiver circuit includes the well-known "Sensicon" circuit with the Permakay filter which guarantees permanent selectivity under all conditions of temperature, humidity and vibration. The receiver includes a total of 21 tubes and uses only 5 tube types adding economy to maintenance. The transmitter, which has a nominal power output of 20 watts, employs nine tubes.

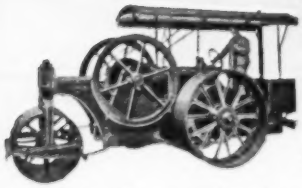
The mobile unit is packaged in a sturdy, single unit drawer-type, breakaway housing which simplifies servicing by making each component easily accessible. The base station equipment is a locally controlled unit housed in an attractive desk-top cabinet.

A remotely controlled base station housed in a completely weatherproof cabinet and suitable for outdoor installation is also available as complementary equipment for these models.

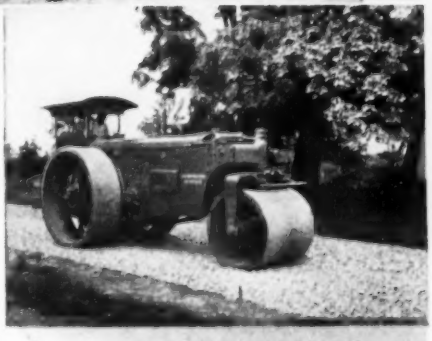
SINCE 1907

# Famous for Dependability





They said it of the "one-lunger" of 1907, and they say it today . . . "Austin-Western rollers stay on the job day after day, and month after month, with less time lost for mechanical adjustments, maintenance and repair." That's DEPENDABILITY! Add to it the precision job of rolling that results from such things as Proper Weight Distribution, Vibrationless Power Units and Smooth Acting Clutches, and you have everything needed for top grade performance. The Autocrat is made in 10- and 12-ton sizes. Each has full-length side plates for maximum rigidity; low center of gravity for smooth operation, and hydraulic power steer. Each may be had with gas or diesel engine. Special equipment includes lights, sprinkling system, canopy top and powerful hydraulic scarifier.



**Austin-Western**
**Power Graders**
**Road Rollers · Motor Sweepers**

BALDWIN BLH LIMA-HAMILTON
Construction Equipment Division

*Manufactured by*
**AUSTIN-WESTERN COMPANY**
*Subsidiary of Baldwin-Lima-Hamilton Corporation*
**AURORA, ILLINOIS, U.S.A.**

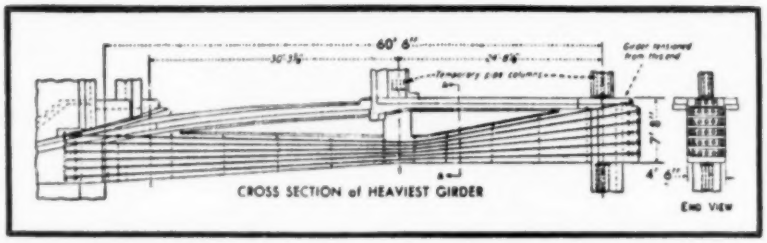
# Rubber-Tipped Vibrators Used on Prestressed Job

Rubber-tipped vibrators were used to insure against possible damage to the protective covering on prestressing cables, in connection with a very heavy girder job completed recently at San Francisco. The structure was a large garage, involving what is said to be the heaviest pre-stressed concrete girders thus far utilized in the United States if not in the world.

Designers and builders of bridges, grade separations and other structures in the highway and street field will be interested in this job, which used as many as twenty-eight 1½-in. cables, plus normal reinforcing bars, in a single girder. To prevent bonding the cables were greased and wrapped with two layers of Sisalkraft paper. Three simple spans 62 ft., 59 ft., and 51 ft. long were involved, plus a 2-span continuous girder, with girder depths ranging from 7 ft. to 7 ft. 8 in.

Proper vibration was considered vital to the proper construction of the girders, to insure good concrete quality throughout. Rubber vibrator tips were considered essential, according to W. H. Ellison of Ellison and King, the consulting engineers. Barrett and Hilp were the general contractors. The Viber rubber-tipped units were inserted in the concrete, then turned on and slowly withdrawn to minimize damage to cables and covering.

★ Prestressing cables and girder reinforcement in place




★ Details of prestressing arrangement

★ Construction in progress on the big girder job

## Reno heads Heavy Constructors Association, Kansas City

S. H. Reno, owner of Reno Construction Company, Overland Park, Kansas, has been elected president of the Heavy Constructors Association. This little publicized organization with offices in the Board of Trade Building, Kansas City, Missouri, was organized three years ago. One of the largest independent contractor groups of its type in the nation, it now has 82 companies as members, mostly located in the Missouri-Kansas area and doing city, county, state and Federal projects such as bridges, rivers, roads and sewers.

Mr. Reno succeeds Lloyd J. Kissick, Sr. Other newly elected officers are Lyle Cushing of the Kansas City Bridge Company, vice-president, and George R. Haydon of the Union Construction Company, treasurer.

The association's board of directors include Henry J. Massman, Sr., bridges-rivers division; George Bennett, excavating division; John Tetyak, sewers division; Matt Bowen, bituminous division; Edward Clarkson, railroad division, and Joseph Tobin, concrete paving division. James E. Burke was re-elected chairman of the labor negotiations committee.

# *You can tell by the* **PERFORMANCE..**

## *sure they're* "Eucs"!

Wherever they're put to work, "Eucs" do the kind of a job that makes them the preferred equipment for moving earth, ore, rock and coal in off-the-highway service.

Big payloads, fast travel speeds and high job availability add up to more loads per hour and more profit per load. Whatever the job . . . building highways, dams, levees, airports . . . working in mines, quarries or on industrial projects, you can depend on "Eucs" for low cost hauling.

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**Euclid Scraper**—15.5 cu. yds. struck, 21 cu. yds. heaped at 1:1 slope . . . 275 h.p. engine . . . top speed, loaded, 28.2 m.p.h.

**Bottom-Dump Euclids**—13 to 25 cu. yds. . . . 190 to 300 h.p. . . . top speeds loaded to 34.4 m.p.h.

**Rear-Dump "Eucs"**—10 to 34 tons . . . 125 to 400 h.p. . . . spring mounted or semi-rigid drive axles . . . top speeds loaded to 36.3 m.p.h.

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## New Technical Literature

**"Pavement-Marking Materials; Bulletin 57."** Contains ten papers presented at a symposium on pavement marking materials and methods, 31st Annual Meeting, Highway Research Board. Also a bibliography with 224 references. For copy, address Highway Research Board, 2101 Constitution Ave., Washington 25, D. C.

**"Night Visibility."** 77-pages. Bulletin No. 56, Highway Research Board. Contains four papers on this subject, given under sponsorship of the Committee on Night Visibility. For copy, address Highway Research Board, 2101 Constitution Ave., Washington 25, D. C.

**"Statistics, With Applications to Highway Traffic Analyses."** By Bruce D. Greenshields and Frank M. Weida. Eno Foundation for Highway Traffic Control, Saugatuck, Connecticut, Published in 1952.

**"Proceedings, 28th Annual Convention, Association of Highway Officials of North Atlantic States."** Issued by Office of Secretary, 1035 Parkway Avenue, Trenton, New Jersey.

**"Curing of Concrete Pavements."** Revised edition of current road problems bulletin No. 1-R, October, 1952; the Highway Research Board, 2101 Constitution Avenue, Washington 25, D. C. Includes definitions, recommended practice; specifications for cotton mats, burlap and waterproof paper; also a proposed revised tentative method of tests for water retention efficiency of liquid membrane forming compounds and impermeable sheet materials for curing concrete.

**"Connecticut Highway Maintenance Production Study."** Special Report No. 8, Highway Research Board. Conducted jointly by Connecticut State Highway Department and Bureau of Public Roads, under Fred B. Farrell, Chief, Highway Cost Section of BPR. 220 pp. Address The Highway Research Board, 2101 Constitution Avenue, Washington 25, D. C.

**"Safety Bulletin,"** Corps of Engineers, January-September, 1952. Analysis of accidents on Corps of Engineers' construction projects during period. Photos and data making valuable reference for contractors' superintendents and project managers.

**"Night Visibility."** Bulletin 56, Highway Research Board, contains five papers presented at 31st Annual Meeting. Published December, 1952. For copy address the Highway Research Board, 2101 Constitution Avenue, Washington 25, D. C.

# WITH THE MANUFACTURERS & DISTRIBUTORS

**LeTourneau Sales Department Changes.** A. M. (Ben) Krider, heretofore district sales representative for central Canada and North Central U. S., for R. G. LeTourneau, Inc., Peoria, Ill., has been appointed central sales manager, succeeding W. V. Richards who has held that position since 1948. Richards is joining LeTourneau distributor Great Plains Equipment Co., Omaha, Neb., as manager of construction equipment sales. Taking over Krider's former position is John Tuntas, who has had 12 years experience in the heavy construction field. John Sharda, who has been in the sales field for the past 10 years has been appointed district sales representative for Iowa, Illinois and Indiana. He succeeds R. E. Dickerson, who held this position since 1948. Dickerson is joining LeTourneau distributor Illinois Contractors' Equipment Co., as manager of the East Peoria, Ill., branch office.

**Le Roi Engineers Promoted.** C. H. Bouvy has been promoted to the position of chief design engineer of Le Roi Co., Milwaukee, Wis. Henry Osterkamp has been promoted to the position of field research and development engineer for the Construction and Mining Equipment Sales Department. Bouvy, who was an engine designer with the Cadillac Division of General Motors Corp. before joining Le Roi in 1944, will be in charge of both engine and compressor design for Le Roi.

**New Gradall Distributors.** Three new distributors to handle sales and service of Gradall Earthmovers have been announced: C. B. Stillwell Equipment Co., Omaha, Neb., for Nebraska and Western Iowa; Rocky Mountain Machinery Co., Salt Lake City, Utah, for Utah and bordering counties in Idaho and Wyoming; Leonard Motor Co., Albuquerque, N. Mex., for New Mexico.

**Armco Executive Appointments.** Logan T. Johnston, heretofore general manager of sales of Armco Steel Corporation, Middletown, O., has been elected vice president in charge of sales. This office has been vacant since the death of John A. Ingwersen several weeks ago. Wallace B. Quail, heretofore manager of central area sales, has been appointed manager of the sales division.

**Bishop Appointed General Manager.** James F. Bishop, in addition to his corporate duties of secretary-treasurer, has been appointed general manager of American Hoist and Derrick Co., St. Paul, Minn. A veteran of 30 years service with American Hoist, Bishop has been secretary-treasurer since 1945 and a member of the board of directors since 1951.

**Caterpillar Promotes Risk and Frank.** Norman E. Risk and Richard S. Frank have been appointed assistant chief engineers of Caterpillar Tractor Co., Peoria, Ill. Risk will be in charge of the administration of design and development of crawler tractors. Frank will be in charge of the design and development of diesel engines.

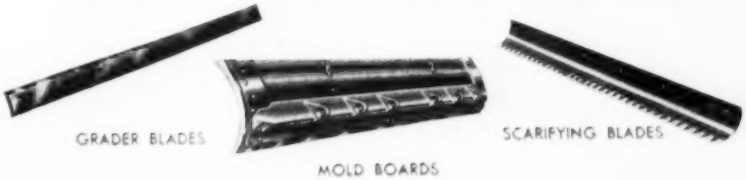
**Harnischfeger Promotes Leopold.** Gordon E. Leopold has been promoted to district manager of the Minneapolis office of Harnischfeger Corporation, Milwaukee, Wis. P. H. Sackett continues as manager of farm welder sales for the Minneapolis welder territory.

To a contractor, keeping a gimlet eye on grading problems is as vital as the weather. A Shunk blade on his 'dozer assures him a high quality mud slinger which can take punishment almost forever.

To the original equipment producer, the Shunk blade, as an integral part of his product, means the assurance of almost a century of development. Shunk's modern production facilities, quality product and reputation *guarantee* favorable competitive relationships.

Need a high quality mud slinger? We'll gladly provide you with full information.

**3000 DIFFERENT SPECIFICATIONS**

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*In Our 98th Year*

**BEST BLADES MADE**

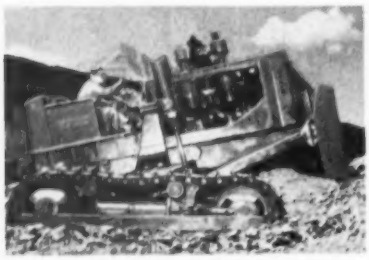
BUCYRUS, OHIO

# Notes on Equipment and Materials For ENGINEERS AND CONTRACTORS

1

## New "no-pushbeam" dozer has versatility, portability

A bigger, more powerful dozer, the 15X, of design similar to the 9X "no pushbeam" bulldozer, has been announced by The Baker Manufacturing Co., Springfield, Ill. Developed in cooperation with Allis-Chalmers, the new 15X mounts on the A-C HD-15 tractor, and features integral tractor-dozer construction; legal highway portability (without permits)—only 96 in. wide; big yardage capacity—51 in. high moldboard; 39½ in. blade rise and 15½ in. drop below ground; greater track oscillation;



Baker 15X Bulldozer

center of gravity permitting draw bar work with dozer mounted; operator-ease control; design for easy servicing, and less weight—lower cost. The accompanying picture shows the new no-pushbeam bulldozer at work on heavy loose rock in rough terrain.

As a result of Baker's development of the unique lifting mechanism, with tractor frame and dozer frame rigidly bolted together, closer mounting of the dozer blade to the tractor, and the suspension of the entire front end from two powerful hydraulic arms, the 15X is capable of exerting much more of the tractor's weight, and engine horsepower, into positive down pressure for a faster, surer blade bite.

**Circle above number on bound-in card for more information.**

2

## New masonry drill permits continuous drilling

Dust packing which causes stalling is stated to be overcome by the unique design of a new masonry drill being introduced by Holub Industries, Inc., Dept. R-S, Sycamore, Ill. It is claimed that the drill, called "Hi-Twist", can be used for continuous drilling of concrete, stone, brick, and similar masonry materials as well as copper, brass and other soft metals. The secret of dust removal is in the proper combination of oval flutes, narrow lands and fast spiral which carries the dust up and out of the hole as fast as it forms. As a result, less pressure is required and drilling can continue to desired depth without once removing drill to clean the hole. The drill can be used with any tool. The "Hi-Twist" drill is made of a very tough alloy steel and has a Carboloy tip.

**Circle above number on bound-in card for more information.**

3

## 30-ton Moto-Crane added to Lorain line

A new 30-ton lifting capacity machine has been added to the Lorain line of cranes on rubber of The Thew Shovel Co., Dept. R-S, Lorain, O. It is available in both moto-crane and self-propelled models. The new model designations are Lorain Moto-Crane Model MC-524 and Lorain Self-Propelled Model SP-524. The Moto-Crane consists of a 30-ton capacity turntable mounted on an automotive type 3-axle carrier having 10 speeds forward and 2 reverse. It can travel over the highway at speeds up to 30 mph and has double rear axle bogies and the tractive effort to enable it to travel over soft ground and rough terrain. Both gasoline and diesel power plants are available. Carrier is available with 2-rear driving axles only (6x4) or with the addition of a front driving axle (6x6). Air brakes, air assist steering and all the accessories for highway operation plus many extras are standard equipment.

New Lorain 30-Ton Crane

The MC-524 is convertible to shovel, crane, clamshell, dragline or hoe. It is rated in the 1 cu. yd. class as a shovel. The Self-Propelled Model, built for more limited travel needs consists of the same basic 30-ton turntable mounted on a three axle carrier that is propelled by the turntable engine which may be either gasoline or diesel. Drive is on two rear axles only. There are 4-speeds in both directions with a top travel speed of 7½ mph. Air brakes and full air steering are operated from turntable cab. The SP-524 is available as a crane and dragline only. The Moto-Crane is 120-in. overall width, the Self-Propelled machine 123-in. These widths give great lifting capacity without the use of outriggers, thus combining instant travel with heavy duty lifting.

**Circle above number on bound-in card for more information.**

4

## Belt conveyor idler has many new features

A new type unit sealed, prelubricated Timken bearing belt conveyor, announced by Industrial Division, Continental Gin Co., Dept. R-S, Birmingham 2, Ala., is designed to operate for extended periods of time without relubrication. The unit bearing assemblies provide an ample but not excessive grease reservoir. This effects a saving on grease and further eliminates any possible migration of the grease from upper to lower bearings on inclined rolls.

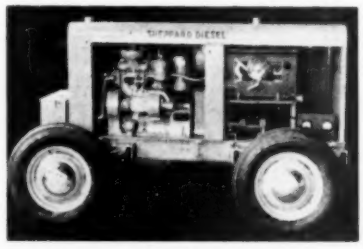
The lubricant is a top quality water repellent grease of a stable consistency with a wide temperature range for long life. Also, these unit bearing assemblies "sealed unto themselves" prolong belt life by prevention of grease migration through seals onto the belts. The Continental "UST" Idler is so designed that prior to lubricant reaching a point of deterioration the Idler may be simply relubricated; or dis-assembled, cleaned, re-lubricated, and re-assembled for another extended period of time.

**Circle above number on bound-in card for more information.**

5

## Small portable arc welders powered by diesel

A new line of small portable arc welders, powered by their simplified diesels, is being introduced by the R. H. Sheppard Co., Dept. R-S, Hanover, Pa. These are stated to be the first arc welders of 200, 300 or 400 ampere capacities to be powered with a diesel. Smallest of the Sheppard arc welders, including the diesel, is 45⅝ in. high, 27½ in. wide and 63½ in. long on a skid base. Welders are built as integral units mounted on four-wheel



Sheppard Diesel Arc Welder

trailers and are ready for instant use upon delivery. Models are also available mounted on steel I-beam bases.

**Circle above number on bound-in card for more information.**

6

## Advanced new line of contractors' pumps

As a result of an extensive research policy, the Ralph B. Carter Co., Dept R-S, Hackensack, N. J., has evolved a number of new developments in Contractors' pumps that has brought about a completely new and different line of Humdinger self-priming centrifugals. The only components inside the volute cases of the new pumps are the impeller and the seal. The development of twin coaxial volute passages, by Carter engineers, is claimed to result in a highly efficient volute design that offers greater capacity, faster priming and more trash handling ability. An entirely new principle of adjustment compensates for impeller wear without disassembling or replacing a single interior part. The pumps are made in a complete range of sizes 1½ in. to 10 in.

**Circle above number on bound-in card for more information.**

New Humdinger Pump

7

## Galion announces new model 503 motor grader

A new model 503 motor grader has been added to the line of The Galion Iron Works & Mfg. Co., Dept. R-S, Galion, O. According to the manufacturer the machine is designed and built like big motor graders yet it has a price tag that will fit in with limited budgets.

Among the important features claimed for this grader are: positive four-wheel tandem drive; extra-strong, box type, high-arched frame; heavy 4 in. square solid steel drawbar with heavy-duty ball-and-socket connection to head block. Extra-large hydraulic cylinders assure more than adequate power for making blade adjustments. A direct drive hydraulic pump supplies power for the operation of the controls. A 40 h.p. gasoline engine is standard. The Galion 503 transmission provides four forward speeds of 2.3 to 20.4 m.p.h. and a high reverse of 4.3 m.p.h. A ruggedly constructed high-clearance front axle, 600.20 front tires and 7.50-20 rear tires are other features of interest. Specifications list the grader weight as 8,720 lb. and blade pressure of 4,975 lb.—both without extras.

Big grader type attachments available with the Model 503 include a hydraulic shiftable mold-board which is said to increase the versatility, scope and ease of blading operations. It is operated from the cab and has a horizontal travel of 30 in., providing a 45 in. maximum reach right or left, outside the front tires. Another useful feature is leaning front wheels which are available as an extra.

**Circle above number on bound-in card for more information.**

8

## New rock drill has radical innovations

An air-leg rock drill combination designed as a completely integrated unit is being offered by Ingersoll-Rand Co., Dept. R-S, 11 Broadway, New York 4, N. Y. Known as the JR-38 Jackdrill it has features not available in Jackhamer air-leg combinations. The most radical innovation is a built-in air coupling between the drill and the feed leg doing away with the third hose necessary in previous combinations. Also, the control valve for feed leg pressure is built into the backhead of the drill where it is always convenient to the operator. In addition, the feed leg pressure can be shut off with the throttle valve

JR-38 Universal Jackdrill

which controls the operation of the drill. This feature eliminates feed leg pressure adjustment everytime the drill is moved for another hole. The backhead is designed so that flushing water is turned on when the throttle is opened. The universal jackdrill can be used either as a drifter, stopehamer or jackhamer. For jackhamer use, the feed leg is detached from the drill by simply loosening the coupling nut and is ready for use without any further adjustment.

**Circle above number on bound-in card for more information.**

9

## Non-toxic wood preservation for timber dimensional control

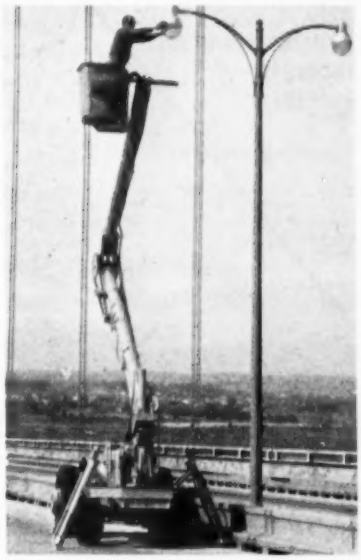
A new non-toxic sealer announced by The Wilber & Williams Co., Dept. R-S, 130 Lincoln St., Boston 35, Mass., is claimed to make possible the dimensional control of raw lumber. This new product, Checkmate, has been developed to meet the demand for a wood preservative which would control swelling and checking in raw lumber without the use of toxics which sometimes are detrimental to the hands and face of the users. Checkmate is produced with a clear synthetic resin sealer, and is particularly recommended to prevent shrinking and swelling of plywood, wood siding and sash and doors.

**Circle above number on bound-in card for more information.**

41

## Auxiliary aerial equipment for Schramm pneumatractor

One of the most recent adaptions of the Pneumatractor of Schramm, Inc., Dept. R-S, West Chester, Pa., with auxiliary equipment is illustrated below. This equipment, known as the Sky Lift, is a man carrying mechanism consisting of a crow's nest mounted on a rotatable articulated boom and controlled either at the crow's nest or at ground level for elevation, extension and rotation. When mounted on the Pneumatractor it forms a compact, safe mechanism for all types of aerial work. Its large capacity (500 lb.) pro-



Pneumatractor with Sky Lift

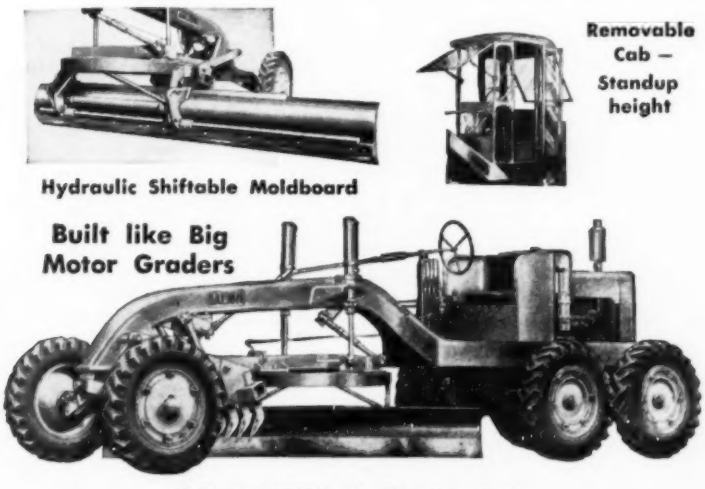
vides for two man operation either in one or two crow's nests, or for the carrying of considerable weight in tools and parts in addition to the operator. Air for operating tools such as, drills, sprays, grinders, and the like, at these heights, is available through an air hose installation inside the boom. For larger tools, a larger hose can be clamped to the boom. The working height from ground, average man, is 37 ft.

**Circle above number on bound-in card for more information.**

42

## Warning signal designed for use on barricades

A new emergency warning signal, announced by The Emarco Corporation, Dept. R-S, P.O. Box 615, Far Hills, Station, Dayton, O., is designed especially for use on barricades. Model AW-C Thoro-Flare is constructed with a permanently fastened mount for use on barricades. It is mounted so light is above barricade, visible from all directions. Signal is attached to barricade by a bolt and lockwasher requiring the use of a tool to detach; thus preventing casual theft. It starts to flash instantly when placed in upright position. It can




Galion Model 503 Tandem Drive Motor Grader

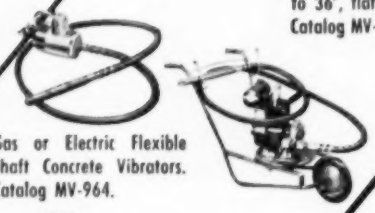
AMERICA'S No. 1 BUY

# Master-Made

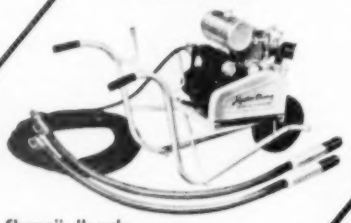
FOR FASTER WORK AND TROUBLE-FREE SERVICE

New easy-to-operate scientifically balanced Gas or Electric TURN-A-TROWEL. Size 34" or 48". Catalog MV-939.

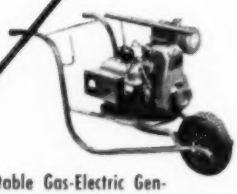
New Concrete Vibratory Finishing Screed, sizes 6' to 36', flat or arc crown. Catalog MV-942.



Gas or Electric Flexible Shaft Concrete Vibrators. Catalog MV-964.



"Master Champ" Hycycle Vibrator, 10,300 RPM. Catalog MV-992.



Portable Gas-Electric Generator Plants, 500 to 17,000 watts. Catalog MV-985.

Trouble-free, "Power-Blow" Electric Hammer and Spade. Catalog MV-981.

Gas or Electric Backfill Tampers. Catalog MV-699.

New Superfast Master Space Heaters, 140,000; 231,000 and 390,000 BTU per hour. Catalog MV-1045.

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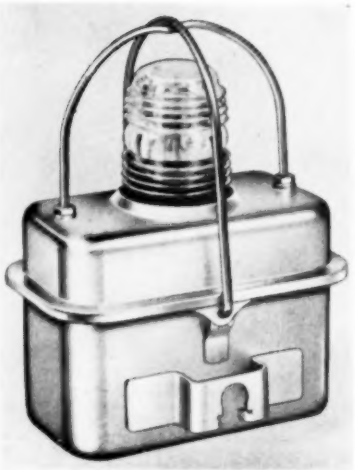


Thoro-Flare Signal, Model AW-C

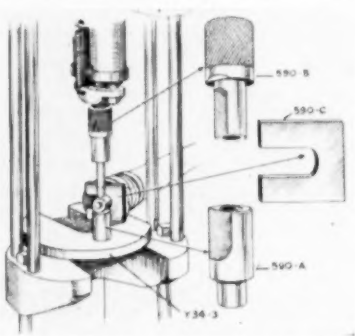
however, be turned to off position without removing from barricade by loosening mounting bolt. Neon flasher unit is fired by a sealed power pack unit which also embodies a mercury switch and electronic flasher. Red fresnel lens and rust resistant metal case are sealed against dirt and moisture.

Circle above number on bound-in card for more information.

## 10

## Joint pin installing and removing set

A new set of tools, announced by Owatonna Tool Co., Dept. R-S, 435 Cedar St., Owatonna, Minn., when used with OTC Y102-A hydraulic pedestral press simplifies the removal and installation of universal joint pins. The new 17½ ton power-twin




Tools for Installing and Removing Joint Pins

ram supplies the power and it is stated that universal joint pins can be removed and installed at the same time with less effort than it formerly took to remove the pin. The set consists of three pieces, 590-A, 590-B and 590-C. (See illustration.)

Circle above number on bound-in card for more information.

## 11

## New roadside sprayer has refinements and improvements

The latest model of the roadside sprayer of Gledhill Road Machinery Co., Dept. R-S, Galion, O., is illustrated herewith. The model incorporates refinements and engineering improvements including the self-contained trailer unit which has complete facilities for power spraying and chemical storage tanks. With its low pressure system, 20 to 30 lb. pressure, the danger of damage to adjacent crops and gardens is

Latest Model Gledhill Sprayer

eliminated. The sprayer does the complete job. When growth is not accessible to the spray boom, the hand boom with its 30 ft. hose can be used.

Circle above number on bound-in card for more information.

### 12

### New camera for recording traffic and road conditions

A new compact, light-weight, and inexpensive recording camera, the Auto Camera Mark 3, has been announced by J. A. Maurer, Inc., Photographic Instrumentation Division, Dept. R-S, 37-01 31st St., Long Island City 1, N. Y. This recording camera, originally designed for aircraft use by D. Shackman & Sons Ltd., London, England is finding application to a very wide range of scientific, engineering, and industrial applications.

Auto Camera Mark 3

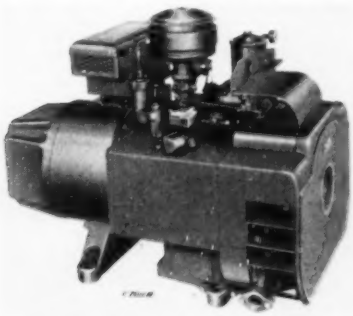
Many accessories are available to permit its use for time-lapse recording, photomicrography, normal and stereo photomicrography, aircraft instrument recording, chemical experiment recording, traffic and highway condition recording and the like. Photography may be automatically accomplished to speeds as fast as 4 pictures per second or at intervals from ¼ sec. to as long as desired. In this way, any number of events may be recorded over relatively long periods of time.

Circle above number on bound-in card for more information.

### 13

### Basically new low-cost electric plant developed

An advanced type air-cooled, gasoline-powered electric generating plant has been



"CW" Model Electric Generating Plant


# ON TO THE NEXT JOB

## in less than two minutes...

## with MILLER *Tilt-Top!*

MILLER "B" 10 ton shown above loading D-4 tractor

**Time saved between jobs means more profit on every job. One man can load heavy units in less than two minutes. Operator drives unit on platform—it tilts, locks . . . and he's on his way with no lost motion. You'll find MILLER Tilt-Top *the* extra trailer for extra production.**

MILLER Tilt-Top saves even more time than other more cumbersome trailers with its better maneuverability, and easier backing. Best of all, MILLER'S exclusive mass production of Tilt-Top trailers cuts original cost for you. Get this extra help . . . extra production now — see your MILLER dealer today!

**handier**

**easy-to-back**

**priced right**

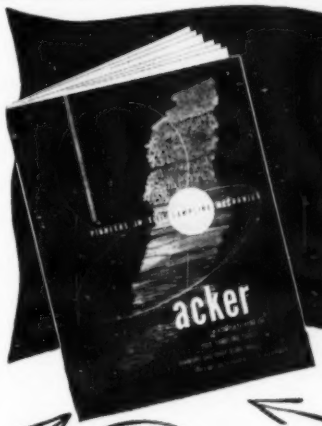
**Model "B" 10 ton $1175**
Optional equipment (priced extra) 16' long platform (8'x14' standard), hydraulic tilt control, 2 speed hand winch and electric brakes.

**MILLER** Tilt-Top TRAILERS *research engineers*

Trade mark reg.

Dept. C-2, 458 So. 92nd Street, Milwaukee 14, Wis.

# FREE! SOIL SAMPLING CATALOG




OVER 80 ILLUSTRATIONS

33 YEARS IN THE MAKING

This complete, instructive collection of information about soil sampling in all subsurface conditions, shallow or deep, with hand or power driven tools, is yours for the asking. Modern sampling techniques are discussed with recommendations as to tools and accessories best suited for fast, accurate, economical sampling.

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**WINS TOUGH CONTRACTS WHERE OTHERS HAVE FAILED . . .**

**Oregon Transfer Company of Portland secures many jobs because of its MICHIGAN Truck Crane . . . tough jobs which other contractors have given up because of crane failures.**

**For example, the MICHIGAN'S superiority was responsible for a sub-contract on the new Folger Coffee Company construction in Portland. Here, in spite of poor soil conditions, the MICHIGAN got into the site easily. Working into tight corners, it kept concrete moving to the forms with no delays, resulting in the successful completion of the contract. In addition, the MICHIGAN played an important part in other construction work at the site. In the opinion of veteran crane operator C. J. Nash, an outstanding feature of the MICHIGAN is its exceptionally rugged rear axle construction.**

**Get *all* the facts about truck cranes and *you*, too, will select MICHIGAN . . . engineered for tough going by America's pioneer truck excavator-crane builders.**

**MICHIGAN POWER SHOVEL COMPANY**
**480 Second Street, Benton Harbor, Michigan, U.S.A.**


perfected by D. W. Onan & Sons, Inc., Dept. R-S, Minneapolis, 14, Minn. Its new, highly efficient vacuum cooling system employs a powerful centrifugal blower which draws cold air through the generator and over the engine, and at the same time discharges heated air out of an 8 in. by 12 in. side vent. Designated the "CW" model, it is now being mass-produced in 5,000-watt and 10,000 watt capacities. Many features usually reserved for heavy-duty design have been incorporated in these new gasoline-powered plants after several years of research experimenting and testing by Onan engineers.

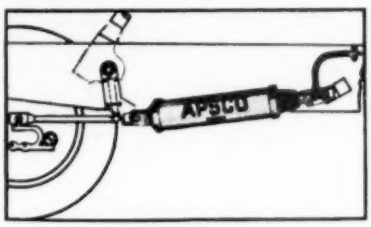
Advantages claimed for the "CW" Model include: Low initial cost per kilowatt of power. Lower operating cost due to its advanced design. Increased durability, plus high output; yet substantial reduction in size and weight per kilowatt. Extremely simple to install, operate and maintain. Maximum safety, with all moving parts, as well as hot cylinders, cylinder heads, exhaust manifold and tubing safely enclosed in the vacuum housing.

**Circle above number on bound-in card for more information.**

### 14

### Booster makes extra heavy steering easier

A new, improved 1953 model power steer booster has been announced by Air-O-Matic Power Steer Corporation, Dept. R-S, 24 Noble Court, N. W., Cleveland 13, O. This ingenious, low-cost, fully automatic steering device utilizes compressed air to supply power for safe, easy steering. The compact, self-contained, lightweight booster is constructed mainly of anodized aluminum; is rust and corrosion-resistant. Its durable construction resists the severe wear of constant day-by-day usage. It requires only a few fittings for easy, quick installation on old or new vehicles without altering or removing any part of the steering mechanism. One end of the booster is fastened to a stationary member of the vehicle and the other end to a movable part of the steering linkage (Pitman arm, drag link, tie rod, etc.) Only one air line is needed.




Improved 1953 Model Power Steer Booster

**Circle above number on bound-in card for more information.**

### 15

### Front dump shovel handles large rock

A new front dump shovel, announced by "Quick-Way" Truck Shovel Co., Dept. R-S, Denver, Colo., will handle large rocks and materials which will not dump through a conventional shovel bucket. The basic unit

Front Dump Shovel at Eagle-Pitcher Mine

was especially designed for underground work in mines where low overhead clearances and maximum dumping heights are required. It is a full revolving, modified "Quick-Way" Model "L" powered by a diesel engine with exhaust scrubbers for underground work, and mounted on a diesel powered M-52 half track with exhaust scrubbers. A cab is optional at extra cost. The front dump, ⅝ yd. shovel attachment is cable controlled throughout and equipped with positive automatic cable crowd utilizing rack and pinion on twin dipper sticks. "Quick-Way" can also furnish a similar attachment for mounting on any standard Model "L" unit for work in quarries and other places where overhead clearances are not involved but where moving large rocks and volumes of materials is a problem.

Circle above number on bound-in card for more information.

### 16

### Diesel road roller has new design features

A new diesel road roller, announced by Dann Diesel Corporation, Dept. R-S, Empire State Building, New York, N. Y., is stated to be of radically new design and to operate on an entirely new principle. It is stated that in operation, this roller will automatically (due to the fact that all three rollers stay as a single rigid unit) exert its maximum pressure on the exact point where levelling is required.

The roller, despite the fact that it operates as a rigid single unit when it comes

Dann-Express Diesel Roller

to down-pressure, is a true three section machine, designed for flexibility of movement. Its turning radius is only 8 ft. These features are due in part to the synchronized power steering which turns front and rear rollers simultaneously, so that the three rollers adjust themselves tangentially, all three rollers following the same track. If required, the middle roller can easily be raised and thus allow the machine to operate as a tandem roller.

Dann-Express rollers are available powered by American Cummins or General Motors diesel or British Ruston & Hornsby diesel engines for certain overseas territories. Model DXR-10 is rated 10 to 13 tons, while Model DXR-6 is 6½ to 8 tons.

Circle above number on bound-in card for more information.

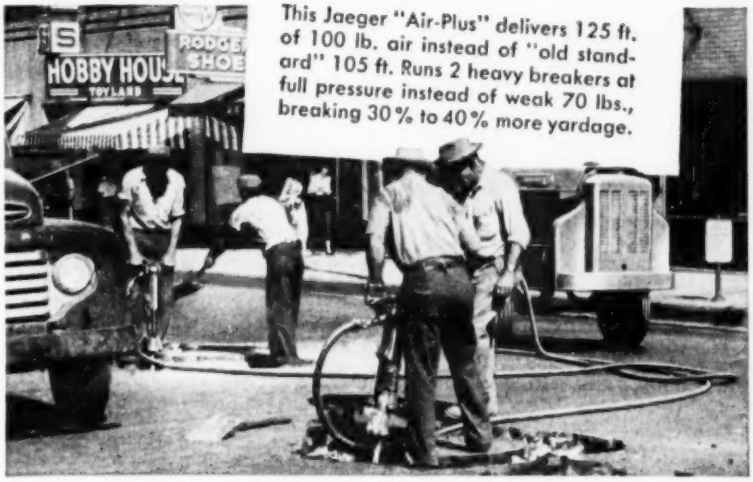
### 17

### Protective coating for submerged machinery

Development of an effective high speed protective coating for submerged machinery has been announced by Inertol Co., Inc., Dept. R-S, 480 Frelinghuysen Ave., Newark 5, N. J. It is claimed that with Inertol grease coating, machinery submerged in water can be completely protected with this coating and back in service in two hours.

Circle above number on bound-in card for more information.


## You Can Do 4 Days' Work in 3 with "New Standard" Jaeger Compressors




This Jaeger "Air-Plus" delivers 125 ft. of 100 lb. air instead of "old standard" 105 ft. Runs 2 heavy breakers at full pressure instead of weak 70 lbs., breaking 30% to 40% more yardage.

**75 ft.**
**125 ft.**
**185 ft.**
**250 ft.**
**365 ft.**
**600 ft.**

30% to 40% increases in production are yours with any "new standard" Jaeger from Model 75 that holds full pressure in a heavy pavement breaker up to Model 600 that runs 2 heavy wagon drills at full pressure with air to spare for hand-held drills. Jaeger Compressors deliver this 15% to 25% extra air at lowest cost per cubic foot of air of any compressor.

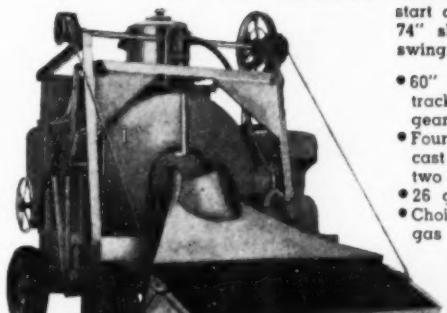
*See your Jaeger distributor or write for Catalog JC-1.*

**THE JAEGER MACHINE COMPANY** 223 Dublin Avenue Columbus 15, Ohio

PUMPS • MIXERS • HOISTS • TRUCK MIXERS • PAVING SPREADERS and FINISHERS

## Get BIGGER VOLUME every day...

### extra quality features at no extra cost in the GILSON 16-S



You get a profit making volume of concrete *every* day from the GILSON 16-S. Job proven features such as the automatic cam operated skip shaker, cut the time on each mixing cycle . . . start a faster discharge when the big 74" skip approaches 50° on the upswing.

- 60" dia. drum has two *machined* tracks and shrouded, cast iron ring gear.
- Four drum rollers of ground chilled cast semi-steel . . . each mounted on two Timken bearings.
- 26 gallon calibrated water tank.
- Choice of air cooled or water cooled gas engines, diesel or electric power.

These and many other quality features . . . assure years of high output-trouble-free service . . . are job proven and backed by GILSON'S more than 41 years of experience in mixer design and manufacturing.
Similar models available with cable or hydraulically operated skips in 6S or 11S sizes.

**GILSON BROTHERS COMPANY**
Fredonia, Wis. Founded in 1921

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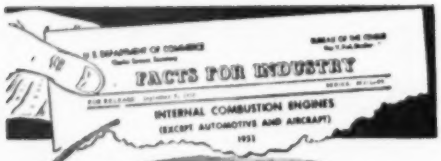
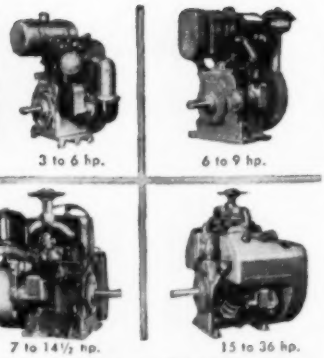
523 W. Gilson Ave., Fredonia, Wis.
Please send FREE bulletin with more facts on ..... mixer.
Company .....
Street .....
City ..... State .....




Proof of Top Preference for




# WISCONSIN HEAVY-DUTY Air-Cooled ENGINES

Based on data contained in a "Facts for Industry" report released on Sept. 5, 1952 by the U. S. Bureau of the Census, an aggregate average of 50.61% of all carburetor type internal combustion engines produced during 1950-'51 within an 11 to 175 cu. in. displ. range (approx. 3 to 40 hp.) were WISCONSIN HEAVY-DUTY AIR-COOLED ENGINES (exclusive of aircraft, automotive, outboard marine and "captive" engines built by various manufacturers for use on their own equipment).

Here is positive proof of top preference for Wisconsin Engines both by original equipment manufacturers and users of power-operated equipment. Proof of constantly growing recognition of the special adaptability of these fine engines to fit both the machine and the job. Proof of heavy-duty dependability and trouble-free air-cooling under weather and climatic extremes.

Wisconsin general-purpose Air-Cooled Engines have been *pre-judged* and *pre-selected* by more power-wise purchasers than ALL other makes of engines combined, within a 3 to 40 hp. power range. Perhaps it's your turn to specify "Wisconsin". Descriptive literature and engineering data on request.

WISCONSIN MOTOR CORPORATION
World's Largest Builders of Heavy-Duty Air-Cooled Engines
MILWAUKEE 46, WISCONSIN

A 7388-¼

OTC

TOUGH JOBS! THEY'RE A CINCH WITH THE CENTER HOLE HYDRAULIC PULLER

The OTC Power-Twin Hydraulic Puller is an ideal maintenance tool, compact, powerful...handles 95% of all pulling and installing jobs on tractors, trucks and heavy earth moving equipment . . . can be used as a portable ram . . . speeds up pulling and installing jobs 75% . . . eliminates torque, friction . . . remote control provides safety. Takes the hard work out of pulling jobs.

17½, 30 and 50 TON SIZES

Famous OTC Center Hole Ram permits fast, easy adjustment to the work and interchange from push-puller to sleeve puller to bench press.

A complete range and variety of pullers, adapters and attachments are available to pull or install bearings, gears, pinions, shafts, studs, wheels, pulleys, etc. Works wonders as heavy duty jack, spreader, straightener or compressor.

Amazingly efficient combination of Portable Pedestal Press and 17½ ton Power-Twin Hydraulic Puller. Every shop will find this unit a must...first few jobs pay for it in time, tools and money saved. Move it where you want it... It's portable.

Quickly removing multiple drive sheaf with OTC Push-Puller and Power-Twin.

See your jobber for complete information or write us.

OWATONNA TOOL COMPANY
435 CEDAR STREET • OWATONNA, MINNESOTA


# MANUFACTURERS' LITERATURE

*Use the post card insert. Just circle numbers of items you wish to have.*

### 18

### Link-Belt speed one-half yard shovel-crane

A 24-page catalog describing its 51 series of shovel-cranes has been announced by the Link-Belt Speeder Corporation, Cedar Rapids, Ia. It is available through the Advertising Department, Dept. R-S, 307 No. Michigan, Ave., Chicago 1, Ill. The fully illustrated catalog No. 2428 covers Link-Belt Speeder's complete line of ½ yd. shovel-cranes including the crawler-mounted LS-51, the truck-mounted HC-51 and the wheel-mounted MS-51 models. Photographs show the equipment under actual operating conditions. Included in the editorial material is comprehensive data covering the upper machinery, crawler, truck and wheel-mounted lower mechanisms for each model. The new catalog also includes a detailed section on the operation, features and advantages of "Speed-o-Matic" controls. Also pointed out is the full convertibility of the 51 Series shovel-cranes which can be used as shovels, draglines, lifting cranes, clamshells, trench hoes and pile drivers.

### 19

### Bibliography available on calcium chloride in concrete

A review of all the significant literature on the subject of calcium chloride in concrete is available in the bibliography, "Calcium Chloride in Concrete," recently prepared by the Highway Research Board. This bibliography presents a complete reference and a source of information relating to the effect of calcium chloride on the properties of portland cement and concrete. Considerable information is given under each listing and readers can easily tell the scope of the original article.

With listings of data from 1885 to 1952, and dealing with various practical aspects of concreting, this bibliography will be of interest to all who work with concrete. Single copies of this 62-page important reference are available on request; ask for Bibliography 13 and write to Calcium Chloride Institute, Dept. R-S, 909 Ring Bldg., Washington 6, D. C.

### 20

### New preventive coatings for construction equipment

A new 6-page catalog featuring Rust-Oleum rust preventive coatings for construction and highway maintenance equipment and for farm implements and machinery has been released by Rust-Oleum Corporation, Dept. R-S, 2799 Oakton St., Evanston, Ill.

24 Actual color chips are included in the new catalog to illustrate the many colors available which match colors of such equipment manufacturers as Caterpillar, John Deere, Massey-Harris, International Harvester and many others. Included are specific applications, uses, and instructions for brush or spray application. In addition, the new catalog also features Rust-Oleum Clear-Sele, the clear liquid finish for use in "mothballing" equipment in outdoor storage and restor-

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Lasts Longer Under Stresses From Knots & Kinks

Tuffy

Braided Construction

SLINGS

Knot it! Kink it--if you can! See how easily the patented braided construction of Tuffy Slings straightens out without damage. Only Tuffy gives you this extra flexibility and long-life strength—because *only Tuffy* has this 9 part machine-braided wire fabric construction that fights off knots and kinks, yet stands up longer when such stresses of distortion happen. Mail coupon below for your FREE 3-ft. sample of Tuffy Sling fabric and test it yourself!

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*Specialists in Wire Rope and Braided Wire Fabric*

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☐ Send FREE Tuffy Sling Handbook and Rigger's Manual.

☐ Have my Union Wire Rope Fieldman bring me a FREE 3' sample Tuffy Sling.

Firm Name_____

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City_____ Zone____ State_____


ing dull colors, and Rust-Oleum R-9, a temporary removable protective coating for clear metal parts.

### 21

### 1953 edition of Gurley Ephemeris is now available

The 1953 edition of the Gurley Ephemeris—including an Almanac, listing 28 selected stars for determining azimuth by stellar observations—has been announced by W. & L. E. Gurley, Dept. R-S, Troy, N. Y. The Almanac section of the 100-page, pocket-size booklet is an abridgment of the American Nautical Almanac, and gives complete instruction for determining azimuths by methods similar to those used in observations of the sun and Polaris. The Ephemeris includes definitions of astronomical terms, descriptions of methods of observation and examples of reducing data for determining a true meridian.

Also included are the following tables abridged from the American Ephemeris and Nautical Almanac and the Standard Field Tables, Bureau of Land Management: Sun's Apparent Declination and Equation of Time at Greenwich Civil Time for each day of the year. Mean Refractions in Altitude and Declination. Semi-Diameters and Parallax of the Sun. Upper Culmination and Elongation of Polaris. Azimuth of Polaris at Elongation and at all Hour Angles. Logarithms of Numbers and Functions. Naural Functions. Conversion Tables of Decimal Parts; Arc to Time; Time to Arc.

### 22

### Tar base protective coatings described in bulletins

A series of five bulletins describing Pitt Chem 100 series of tar base protective coatings has been prepared by Pittsburgh Coke & Chemical Co., Dept. R-S, Room 1953 Grant Bldg., Pittsburgh 19, Pa. One bulletin gives specifications, uses, and methods of applying all four coatings in the series. Other bulletins give detailed information on each of the following coatings in the series: Pitt Chem 101—heavy duty coating for severest corrosive conditions; Pitt Chem 102—a thin, high gloss coating for general maintenance; Pitt Chem 103—for surfaces exposed to corrosive vapors, dilute acids and alkalies; Pitt Chem 104—for long-lasting protection of drinking water piping and tank interiors.

### 23

### Telsmith jaw crushers featured in new bulletin

An 8-page bulletin No. 280 on Telsmith jaw crushers has been published by Smith Engineering Works, Dept. R-S, Milwaukee 12, Wis. Important features of the crushers are illustrated and described and a table is included giving complete specifications and dimensions for the nine sizes of crushers from 10 in. by 16 in., up to 30 in. by 40 in. The Telsmith jaw crusher is an all-steel crusher of the force-feed type equipped throughout with anti-friction bearings. The frame and swinging jaw are made of cast steel.

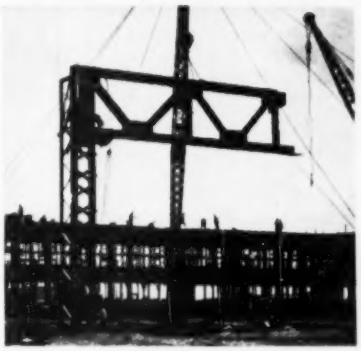
### 24

### The why of land drainage illustrated, described

An attractive 8-page booklet titled "Why Drain Land" has been announced by Gar Wood Industries, Inc., Dept. R-S, Wayne, Mich. This new booklet describes and illustrates in detail the many reasons for tile drainage and underground irrigation.


Tuffy® SLINGS

Fight off Kinking!



"Couldn't Kink Them Even When We Tried"

*Says Owner of an Eastern Construction Company*

(Name on Request)

This Pennsylvania construction company owner also proved to himself that Tuffy Slings are extra flexible, extra strong. Tuffy's patented 9 part machine-braided wire fabric construction gives you a fabric that can be repeatedly bent around abrupt corners. And even when one of the strands is broken or cut, there's no stranding! Give your workmen an easy-to-handle tool that eases and speeds the handling of loads . . . can help you save up to 40% on sling costs. Get Tuffy Slings!

Get Your FREE Sling Handbook
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WIRE ROPE CORP.
Contains plenty of factual, useful data on 12 braided sling types. The only handbook of its kind, and it's yours for the asking!

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Please send my FREE copy of the Tuffy Sling Handbook and Rigger's Manual.

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"THIS LUBRICANT KEPT 'EM ROLLING IN MUD, MUCK AND WATER"

—says J. O. ARCHIBALD
of Redwood City, California

The job was clearing 500 acres of salt marsh for crystallizing ponds. To quote, "We selected LUBRIPLATE No. 107 for track and general lubrication and LUBRIPLATE APG-140 for transmissions and final drives. During the entire job there was no replacements of track rollers nor any tie-ups of equipment due to parts replacement or breakage!"

For nearest LUBRIPLATE distributor, see Classified Telephone Directory. Send for free 56-page "LUBRIPLATE DATA BOOK"... a valuable treatise on lubrication. Write LUBRIPLATE DIVISION, Fiske Brothers Refining Co., Newark 5, N. J. or Toledo 5, Ohio.

**REGARDLESS OF THE SIZE AND TYPE OF YOUR MACHINERY, LUBRIPLATE LUBRICANTS WILL IMPROVE ITS OPERATION AND REDUCE MAINTENANCE COSTS.**

It also tells of the many benefits a farmer gains when he drains land or uses an underground irrigation system. A list of governmental agencies is included where a farmer can obtain financial aid and technical assistance.

### 25

### Three types of air control valves described

A new 12-page illustrated booklet which explains the characteristics and advantages of air power and describes three fundamental types of air control valves has been released by the Ross Operating Valve Co., Dept. R-S, 120 E. Golden Gate Ave., Detroit 53, Mich. The three basic models are the integral pilot operated, known as Ross Introid; the remote controlled, known as Ross Retroid; and direct operated. With minor variations, these units can be adapted to a range of applications. The new booklet is stated to furnish information never before obtainable in printed form.

### 26

### 30-45 ton portable multi-purpose batching plants

A bulletin, N-33, on its new 30-45 ton portable, multi-purpose batching plants of either two or three compartments has been issued by Heltzel Steel Form and Iron Co., Dept. R-S, Warren, O. It contains specifications and views of equipment in use. These new Heltzel bins can be equipped with dual aggregate, truck mixing or universal batchers. They can be easily knocked down and quickly erected for profitable on-the-site batching. They are particularly designed for over-the-highway portability without requiring special permits.

### 27

### Many uses for dumpcrete body described

A new 4-page piece of literature (Form L-116), "The 8 in 1 Utility Body," issued by Maxon Construction Co., Inc., Dept. R-S, Manufacturing Division, 131 N. Ludlow St., Dayton 2, O., describes the versatile uses for the Dumpcrete. This specially designed body for hauling centrally-mixed concrete is now in its 7th year of use by concrete producers. Featured in this new piece are illustrations of several other additional jobs also performed, from bulk cement hauling to water-wagon duties.

### 28

### New herbicide has wide uses as weed killer

A new and improved non-selective herbicide has been announced by Eaton Chemicals Division of American Potash & Chemical Corporation, Dept. R-S, Los Angeles, Calif. It is being marketed under the trade name of Tumble-Weed 25, with wide uses as a weed killer and soil sterilant. The herbicide is a scientifically compounded material containing 25 per cent sodium chlorate and a minimum of 75 per cent solution borates plus a wetting and spreading agent. Properly applied, it will kill weeds and grasses and leave the soil sterile for a year or longer. As a general weed killer it can be applied to both broad-leaf and narrow-leaf types of weeds and grasses.

### 29

### Structural-plate bridge flooring described in booklet

A detailed 12-page booklet on USF structural-plate bridge flooring, published by United Steel Fabricators, Inc., Dept. R-S, Wooster, O., includes a general description of the flooring, step-by-step installation


What's the capacity of this block?

If you don't know.. *don't use it!*

Specify AMERICAN CROSBY Load-Rated! BLOCKS

Safe working capacity embossed on side plate

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AMERICAN HOIST & DERRICK CO.
ST. PAUL 1, MINNESOTA

Servicised Cementone Sponge
RUBBER JOINT FILLER

- Matches Color of Concrete
- Fully Resilient . . . Non Extruding
- Made in Any Degree of Compressibility
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Servicised Cementone Gray Sponge Rubber Expansion Joint meets the need for an inconspicuous joint filler for architectural concrete. Can be supplied in any degree of compressibility to meet you. requirements.

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photographs, photographs of various types of bridges for which it has been used, drawings of engineering details, design data, and specifications. Another section lists the types of plates available for field stocks, and suggestions on how to determine field stock requirements.

### 30

### Applications of hydraulic couplings and torque converters

To help both the user and manufacturer of powered equipment to better understand the application of hydraulic couplings and torque converters, Twin Disc Clutch Co. of Racine, Wis. has released a 32-page special issue of Production Road, titled "Coupling or Converter?" The special issue is the result of many requests for an explanation as to where couplings or torque converters should be used, and why —and to "boil down the engineering jargon on hydraulic transmission of power, and furnish a source of clear, solid facts stripped of the technical jaw-breakers too many take for granted."

### 31

### Fifty-three asphalt plant set ups pictured

"Simplicity in Pictures" is the particularly appropriate title of a 32-page catalog published by The Simplicity System Co., Dept. R-S, Chattanooga, Tenn. It contains 53 pictures of asphalt plant set ups by contractors in addition to numerous illustrations of the various features of Simplicity asphalt plants. Sections are included on air washers, asphalt storage, dryers, dust collectors, feeders, mixers and asphalt tanks. Two pages of pictures show the steps in erection of a plant.

### 32

### Filters and elements for protecting diesel engines

An instructive 4-page circular illustrating and describing Winslow filters and elements has been issued by Winslow Engineering Co., Dept. R-S, 4069 Hollis St., Oakland 8, Calif. These filters have "pressure control," an exclusive Winslow built-in system making it possible for hot or cold oil to pass through the element instead of the by-pass under contaminated element conditions.

### 33

### New wood level has metallic-sealed vials

A folder descriptive of its new 48-in. aluminum bound masons' wood level has been announced by The Columbian Vise & Mfg. Co., Dept. R-S, 9023 Bessemer Ave., Cleveland 4, O. Level features and specifications are fully listed. Line sketches are used to show design and construction details. The new level is completely enclosed with aluminum on every edge. Another feature is the use of "metallic-sealed" vials which eliminate use of the conventional glass drawn tips.

### 34

### Hydraulic torque converter drives for trucks

How truck-type three-stage hydraulic torque converter drives improve performance, prolong equipment life and prevent operator fatigue in heavy hauling, is explained in a bulletin (No. 501) published by The Twin Disc Clutch Co., Dept. R-S, Hydraulic Division, Rockford, Ill. The bulletin describes application to on-highway and off-highway units, and explains the dual advantages of highest torque multiplication for pulling and torque converter braking, both exclusive in Twin Disc converters.

### 35

### Dump bodies, hydraulic hoists, end loaders

A new catalog describing its line of dump bodies, hydraulic hoists and end loaders has been announced by The Gallon Allsteel Body Co., Dept. R-S, Gallon, O. Outstanding catalog feature is a handy reference table which permits the user to easily select the exact hoist and body best suited to his needs. Action photographs, engineering diagrams, complete technical data information and mechanical specifications are other catalog features. Full data is included on a collection of equipment ranging from light duty pick-up truck units to twin telescopic, 3 stage tandem axle trailer dumps.

### 36

### Universal jackdrill advance in rock drill design

The new JR-38 Universal Jackdrill is illustrated and described in a 4-page circular issued by Ingersoll-Rand Co., Dept. R-S, 11 Broadway, New York 4, N. Y. This is an air-leg rock drill designed as a completely integrated unit. It has features not available in Jackhammer air-leg combinations. The drill can be used either as a drifter, stopehammer or jackhammer.

### 37

### "Steel-like" rubber cones for traffic control

A 4-page circular has been issued by Raditor Specialty Co., Dept. R-S, Charlotte, N. C., picturing and describing the use of its Safe-T-Cone all-rubber traffic guides. These cones are now available in two sizes: 18 in. high and 28 in. high. Safety signs are now available to fit on top of the cones.

### 38

### Electronic track scales for weighing freight cars

A new catalog on electronic track scales for motion and stationary weighing of freight cars has been issued by Cox and Stevens Aircraft Corporation, Box 30, Dept. R-S, Mineola, N. Y. The scales are described and illustrated and data are given on accuracies, installation, operation and maintenance.

### 39

### Hose couplings and fittings

An 8-page bulletin on Le-Hi Quick-Lock hose couplings and fittings, issued by Hose Accessories Co., Dept. R-S, 2704 No. 17th St., Philadelphia 32, Pa., tells how the U-shaped gasket, expanding under line pressure, provides a tight seal under all working pressures from 10 to 2,000 lb. in hydraulic service, or 1,500 lb. in non-poisonous, noninflammable gas service. The bulletin describes six types and where they are to be used. It is stated that the hose couplings and fittings are coupled and uncoupled in half a second or less, and work equally well on air, water, gas, oil, hydraulic or steam lines. Once coupled they are safely spring locked and cannot become disengaged accidentally and the hose is easier to move because there are no outside projections.

### 40

### Figure-fact efficiency for contractors and builders

A folder (No. Ad 535) on the use of its printing calculator has been released by Remington Rand, Inc., Dept. R-S, 315 Fourth Ave., New York 10, N. Y. Use of the printing calculator is claimed to assure top figuring speed for estimating, figuring costs, payroll computations, insurance records, extension of bills, tax computations, etc. The printing calculator combines short cut multiplication and automatic division with high speed listing, adding and subtraction, and gives printed proof of every factor on tape. Five single sheet application flyers explaining various construction, engineering and other figure work procedures are also available with the folder.

### 43

### Complete line of drill presses covered in catalog

A new 12-page catalog, No. 5206, covering its complete line of drill presses has been issued by South Bend Lathe Works, Dept. R-S., South Bend 22, Ind. Well illustrated with both photos and line drawings, all the salient features of the drill presses are clearly explained. In addition to the precision model drill press, lower priced economy model and several multi-spindle production models are featured. Several pages are given over to the many production boosting drill press attachments manufactured and supplied by the company.

### 44

### Cold galvanizing process

After two years of extensive testing, an entirely new method of cold galvanizing for surface protection of steel and iron has been announced by Galvanite Corp. It is stated that the new process, which utilizes "Galvanite" cold galvanizing compound, is not a paint. The compound may be applied with any ordinary paint brush, electric spray gun or by cold dip. Special equipment or personnel training is unnecessary. The new process is claimed to give effective results on any structure from an iron or steel bridge to a rusted garden gate.

### 45

### Multi-section stock valves

A new bulletin No. 3104, illustrating and describing its ½ in. and ¾ in. multiple section stock valves is available from Sundstrand Machine Tool Co. These valves are used on road machinery and other construction equipment. The bulletin is complete with necessary data, drawings and typical circuits.

### 46

### Engine-driven arc welders

scribing the complete line of Hobart gasoline engine-driven arc welders is available from Hobart Brothers Co. Complete electrical and mechanical specifications are given for the arc welders and combination model of arc welder and power unit.

### 47

### Low pressure roadside sprayer for weed control

A 2-page specification and descriptive sheet on its latest model roadside sprayer for weed control has been issued by Gled-

hill Road Machinery Co., Dept. R-S, Galion, O. This sprayer has a self-contained trailer unit which has complete facilities for power spraying and chemical storage tanks. It has a low pressure system of 20 to 30 lb. pressure, which eliminates damage to adjacent crops.

### 48

### New guide shows how to combat corrosion

A new illustrated brochure, designed to help solve corrosion problems has been released by Tapecoat Co., Dept. R-S, 1523 Lyons St., Evanston, Ill. Based on the company's experience in serving the gas and oil fields, transportation and communication, water and sewage and chemical and industrial applications, the brochure presents practical suggestions to combat corrosion. It includes details on how and where coal tar protection can be used to best advantage and offers case histories to show how corrosive problems have been overcome in many fields.

### 49

### New booklet on Liddicoat drill bits available

A new booklet on Liddicoat drill bits has been announced by Calumet Division of Calumet & Heela, Inc., Dept. R-S, 3 Calumet Ave., Calumet, Mich. The booklet illustrates two drilling advantages claimed for Liddicoat bits: exclusive pilot construction design and sturdy attachment of bit to the drill steel. Featured are the type "L" bits for easy to drill ground and the type "H" bits for strong rock and abrasive ground.

### 50

### Four types of water suction hose

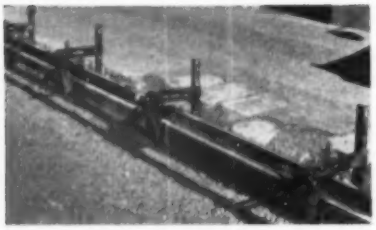
A new catalog on its water suction hose has been published by The B. F. Goodrich Co., Dept. R-S, Akron, O. The catalog describes four types of hose which cover all suction hose service. A table lists types of fittings and their recommended uses. The catalog also lists specifications, describes materials and methods used in construction of the hose and recommended uses.

### 51

### Five grades of air hose described

A new catalog on its line of air hose has been published by The B. F. Goodrich Co., Dept. R-S, Akron, O. The catalog describes five grades of air hose with tough, oilproof covers to prevent peeling. Specifications are listed and materials and methods used in construction are described, along with recommended uses for the various types of air hose.


## California Contractor cuts curb costs with Pacific Clamps



Hal Bennett, Contractor, Oakland, California, cut construction down time and saved many valuable man-hours by using Pacific all-steel reusable Clamps on a recent integral curb job.

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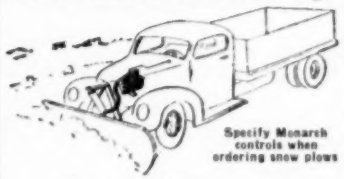

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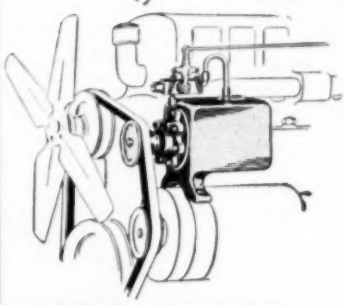

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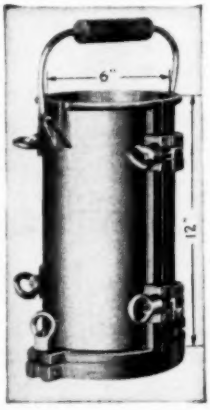


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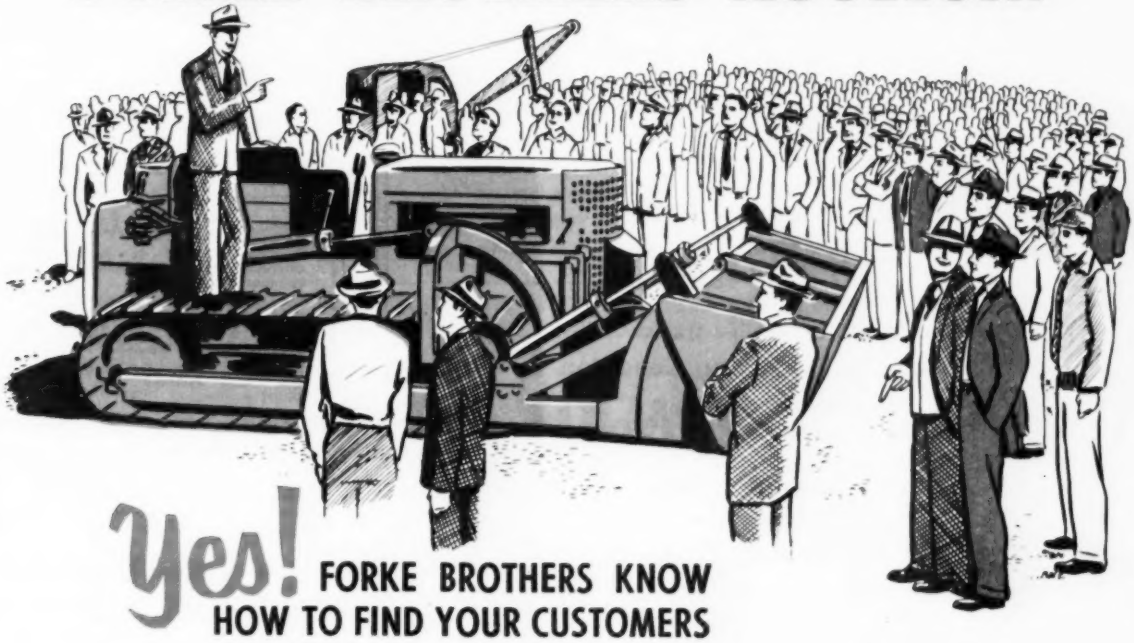

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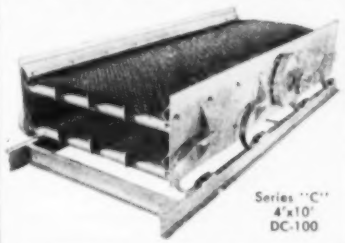

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1—Bucyrus-Erie Model 22-B ¾ yd. Crawler Dragline 1952 Model. Excellent condition.

1—Caterpillar Tractor D7 with angledozer, late model.

1—Caterpillar Tractor D4 with angledozer, late model.

1—Caterpillar Tractor D6 with angledozer, 9U series.

2—Model D Caterpillar Tractors, with angledozers.

1—Allis Chalmers Tractor HD-7.

1—Insley Model K-12, ½ yd. diesel crawler crane, late model.

1—Lorain Model 80, 1¾ yd. Diesel Crawler Crane.

1—Lorain Model 50 Diesel Crawler Shovel, new 1951.

1—Caterpillar #12 motor grader, AT Series, late model, only two years old. Guaranteed A-1 condition.

1—½ yd. Unit 1951 Model Crawler Shovel.

1—Lorain Model 820 Diesel Crawler Shovel.

1—Quickway Model J truck crane combination dragline and backhoe and ½ yard bucket. Mounted on Autocar FWD truck. Both excellent condition. Sacrifice for quick sale.

1—Link Belt Speeder, Model LS-50, ½ yd. Combination Backhoe, Dragline and Clamshell, new 1950, with dragline, clamshell and concrete Buckets and Fairleads, 60′ boom, Buda gas engine.

1—500 foot Ingersoll Rand Diesel Air Compressors, late models, mounted on rubber tires.

1—Lorain TL-20 Self Propelled Shovel.

1—Lorain TL-20 Truck crane, late model, 20 ton cap.

1—Lorain M.C.—414 Truck crane, late model, 20 ton cap.

1—Cat. D8 Tractor with angledozer, late model.

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2—100 hp Erie HRT Boilers 125# WP complete with grates and fittings.

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LeTourneau Crane—better than 50 ton lift

2 - G.M.C. Dump Trucks 6 x 6

1 - Studebaker Dump Truck 6 x 6

4 - C - 11 Tournapulls

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1—105 cfm Worthington Compressor, Hercules gas engine 4 wheels
2—10" cmc Centrifugal Pumps, Waukesha gas engines, skid mounted
1—10" Marlow Centrifugal Pump, Waukesha gas engine, 4 steel wheels
2—10"x12" Moretrench Wellpoint Pumps, 4 cyl., G.M. Diesel engines
1—Barnes 6" centrifugal Pump, LeRoi gas engine, skid mounted
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1—300 amp. P & H Welding Machine, Continental engine, 2 pneumatic tires
1—Haiss Portable Conveyor
1—3 kw Red Devil Generators, D.C., 2 pneumatic tires
1—6 kw Universal Generator, D.C., 2 steel wheels
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1—2½ ton 1942 Chevrolet truck—4 wheel drive—dump body
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**1—500 CFM Cat Power Portable Worthington Compressor**
**1—315 CFM Herc Diesel Portable Sullivan Compressor**
**1—500 CFM V-Type Electrical Stationary Compressor**
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96—EUCLID Bottom-Dump Tractor-Wagon Units—all with G-M Model 671RA54 Diesel Engines:
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8 Model 38FDT with 89W Wagons—purchased NEW 1950. Serials: 10667 to 10774. (Our No's. 19-26).
10 Model 67FDT with 58W Wagons—purchased NEW 1950. Serials: 10863 to 10872. (Our No's. 27-36).
16 Model 43FDT with 58W Wagons—purchased used 1951. Serials: 1905; 2129; 2345; 5572 to 5578; 7801; 7996 to 8000. (Our No's. 37-52).
44 Model 71FDT with 89W Wagons—purchased NEW 1951. Serials: 11699 to 11726; 11884 to 11888; 12141 to 12145; 12328-29-30-31-33-34. (Our Nos's. 53-96).

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2—EUCLID Model 9BV Loaders, Serials 9BV152 and 9BV153—new 1951—G-M 671RA63 Diesel Engine. Serials 6A14718/20.

1—EUCLID Dolly (for Loaders) Model 109 W, Serial 6256—new 1951.

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1—LIMA Type 604 1½ c.y. Shovel and Crane Combination. Serial: 324122; 90' Crane Boom. Cummins Diesel Engine MBIS-1-600, Serial 72281; 34" treads. (Our No. 1).

3—BUCYRUS-ERIE Model 54-B, 2½ c.y. Shovels, Serials: 17583, 51078, 45413; 36" treads; Buda Lanova Diesel Engines Model 6DC1742 (#2) and 6DC1879 (#4 and #8). (Our No's. 2-4-8).

1—BUCYRUS-ERIE Model 54-B, 2½ c.y. Shovel and Dragline Combination; 36" treads; Buda Lanova Diesel Engine Model 6DC1879; Dragline attachment, 60' Boom, 1¾ c.y. Dragline bucket. (Our No. 3).

2—P&H Model 1055 Shovels, 3 c.y. Serials 12394 and 12395. Buda Engine charged Diesel Engines Model 6DCS1879; 42" treads; high gantry, 28' Boom, 19' Stick. (Our No.'s 5-6).

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1—LORAIN Model TL-20 Moto-Crane, Serial 17942. Shovel—rigged with ½ c.y. Bucket; Backhoe attachment with 30" Bucket; also 50' Crane Boom. Hercules JXD Engine. Truck chassis, Serial 3466, with Hercules JXD engine. (Our No. 1).

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10—Caterpillar D-8 Tractors, with Caterpillar Model 8S Dozers and Model 25 P.C.U. All in 2U Series, 1409, 1596, 2626, 4562, 3587, 4485, 2457, 2216, 844, 4335.

5—Caterpillar D-8 Tractors, with LeTourneau Dozers and LeTourneau P.C.U. All in 8R Series, 8423, 9135, 8981, 8073, 9048.

8—Caterpillar D-8 Tractors, with Caterpillar 8S and LeTourneau Dozers and LeTourneau P.C.U. All in 1H Series, 4826-4831-2312-7932-8331-7856-4236-4830.

2—Allis-Chalmers Model HD19H Tractors, Serials 309 and 269. G-M Diesel Engines Model 671RC39M; Caterpillar 8SS and Baker (Hydraulic) 19B Bulldozers; LeTourneau P.C.U.

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1—CATERPILLAR Grader Model 12, Serial 9K1501, tandem drive, Diesel powered; bulldozer and scarifier attachments.

3—CATERPILLAR Graders Model 12, Serials 7T1906, 7T1402, 9K1848.

4—LETOURNEAU Scraper Units, Model C1H, Serials: C3T5549/2826/2886/2887; Cummins Diesel Engines Model HB1D.

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***Address inquiries to:***

**Peter M. Bianchi, *Project Manager***

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Model A with E25 Scrapers, Buda Diesel Engines — Overhauled — Tires 75% or better —$10,000.00 each.

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Unit Model 1020 pneu. tired mobile crane, 10 tons, 40 ft. boom.

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***All Equipment priced to Move.***

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GALION "102" MAINTAINER, Serial #E88175, excellent tires, completely overhauled, new UD engine.

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100-ft. Boom With 3-Yd. Dragline Bucket. 2½ Yard Shovel Front. Good Condition.

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Highest dollar value paid for new and used trucks and all kinds of used equipment. All types of truck equipment bought and sold, including war surplus. Write, phone or wire:

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1951 88-H Serial #88552
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P & H 955 LC #6167 Dragline - Atlas diesel engine, 2½ cu. yd. Page bucket, 90' boom - Kohler light plant A-1 condition - just completely overhauled.

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STEEL STORAGE TANKS
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1 3500 Manitowoc Serial No. 3729-Buda Diesel, 45 ft. boom, 37 ft. stick, 2 yd. bucket, first clas running condition, can be seen working every day. Price F.O.B. Boomer, W. Va. ..... $40,500.00

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1 Lorain 820 Serial No. 14916 Combination Shovel and dragline powered with D13000 Caterpillar engine. Standard shovel boom, 55 ft. crane boom, and dragline fairlead. Price F.O.B. Rupert W. Va. ..... $25,500.00

Buyer must see this equipment to appreciate them. Reason for selling, lack of coal market.

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**IMPERIAL COAL & CONSTRUCTION COMPANY**
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## SALE OR RENT

Bay City Model 180 Truck Crane, 20-ton
P&H 255 Truck Crane
Bay City ¾-yd. Diesel Hoe, Shovel or Crane
Bay City 25-ton Truck Crane
Northwest #6 Dragline—like new
Insley ½ yard Backhoe
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All sizes Crane Booms ½ to 5 C.Y.

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We have a large stock of new parts for a 15 ton Industrial Brownhoist Caterpillar Crane, type D. C., will send list on request.

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## *To Whom it May Concern:*

**Because of changes in our method of handling coal on our docks, we have the following items for sale F.O.B. Sturgeon Bay, Wisconsin, subject to prior sale.**

**ITEM NO. 1**
1 Dump Box off from G.M.C. truck
7' Wide, 10' Long, 4' Deep
Kewaunee Mfg. Co.
Type No. S.P.L.
Serial No. 868
Complete with large single cylinder hoist in excellent working order

**ITEM NO. 2**
1 Gregory Electric Co. Motor and starting Controls
30 H. P.
860 R.P.M. Full load
440 Volts
3 Phase
60 cycles
38 Amps.
Complete and in very excellent working order

**ITEM NO. 3**
1 Area Hot Water Boiler Furnace 18" Diameter Fire Pot, excellent condition

**ITEM NO. 5**
1 Kewaunee Straight Rod Devil Conveyor
51' Long, 16" Wide, 16" Deep
16" x 5½" Flights
Trough covered over with Lumber
Sold by Ross & White Company, Chicago
Machine No. A1604
Type 6400 A
Motor Century 15 H.P.
Volts 220/440
Speed 1730
Cycle 60

**ITEM NO. 6**
1 Kewaunee Straight Rod Devil Conveyor
52' Long, 16" Wide, 16" Deep
16" x 5½" Flights
Trough covered with steel hood
Sold by Ross & White Company, Chicago
Machine No. A277.7
Type 6400A
Motor G.E. 15 H.P.
Volts 220/440
Cycles 60

**ITEM NO. 8**
1 Rubber Belt Conveyor 31' Long
18" Rubber belt with 1 inch angle irons 8" o.c. cleats
42" Dia Steel wheels—Had 2 sets of axles, can forward & back or travel in a circle. Has pivot and block for lower end also has steel hopper at lower end. Hand raising & lowering
Motor G.E. 5 H.P.
Volts 220/440
Cycles 60
Speed 1735 R.P.M.
Does not have Mfg. Plate

**ITEM NO. 9**
1 Steel Flight Conveyor
31½' Long, 16" Trough, 11" Deep, Flights 16" x 4"
Drive wheels 36" Dia with 10" Cleated tread
Piped to top of conveyor for oil treating coal, has sprinkler
Kewaunee transmission gives traction to drive wheels and raises and lowers conveyor
Wheels drive forward and back
Motor G.E. 3 H.P.
Volts 220/440
Cycles 60
Speed 1730 R.P.M.

**ITEM NO. 10**
1 Kewaunee Track Unloader
Machine No. A3231
Type 5000
Motor Westinghouse 5 H.P.
Volts 220
Speed 870
Cycle 60

**ITEM NO. 14**
Complete Screening Plant consisting of the following: $17,000.00

1. 4 100-150 ton steel hoppers
2. All of the steel supporting and in the complete screening plant, consisting of, we estimate, around 80,000 pounds of steel, channels, I beams & H beams. The steel including supports for shaker screen is included.
3. 1 48 foot conveyor, 16 inches wide, 8 inches deep, complete with motor as now fitted on hopper in the air, leading presently to the Simplicity Screen, weighing approximately five ton.
4. 1 Simplicity Gyrating Screen, three deck, three feet by ten feet including all screens now on hand for same.

**BUSHMAN DOCK & TERMINAL CO., INC.**
**127 Main Street, Green Bay, Wisconsin**

# COMMENT
*from the*
## BUTLER ENGINEER

### Engineer Stripped to Underwear!

Sub-zero here today. Paradoxically it reminds me of a devilish hot day last summer. I was building a new home. So I order the first load of ready mix for my footings. Thought I had arranged for a couple of men to come out with the transit mix truck to handle the pour. My only job would be to sign the receipt — so I am in business clothes.

In comes the concrete but no men. Obviously we have to pour — right then! For the next two hours I'm busier than a chameleon on Joseph's coat. I guide the spout. I shovel concrete. I puddle it and place the reinforcing. And I do the surface finishing.

First, my coat comes off. Then my shirt. Then my pants. I end up clad only in the lower half of my unmentionables — and even then the sweat pours into the mix so fast it becomes a slurry.

*Well, anyway you can't beat concrete batched in a Butler Plant and mixed with sweat from the Butler Engineer. But usually the sweat comes first — before the Plant is built.*

1953 will reach a new and higher high in road construction. Think of the immensity of the Ohio Turnpike. 57 contractors on that one job alone. But compared with new highways, relocations and the like, all over the nation, the Turnpike is like an inch to an ell.

*All in all, gentlemen, it's a lot of yardage — and a hell of a lot of Butler Plants.*

*Be seeing you — on those jobs.*

*The Butler Engineer*

BUTLER BIN COMPANY
959 WAUKESHA, WISCONSIN


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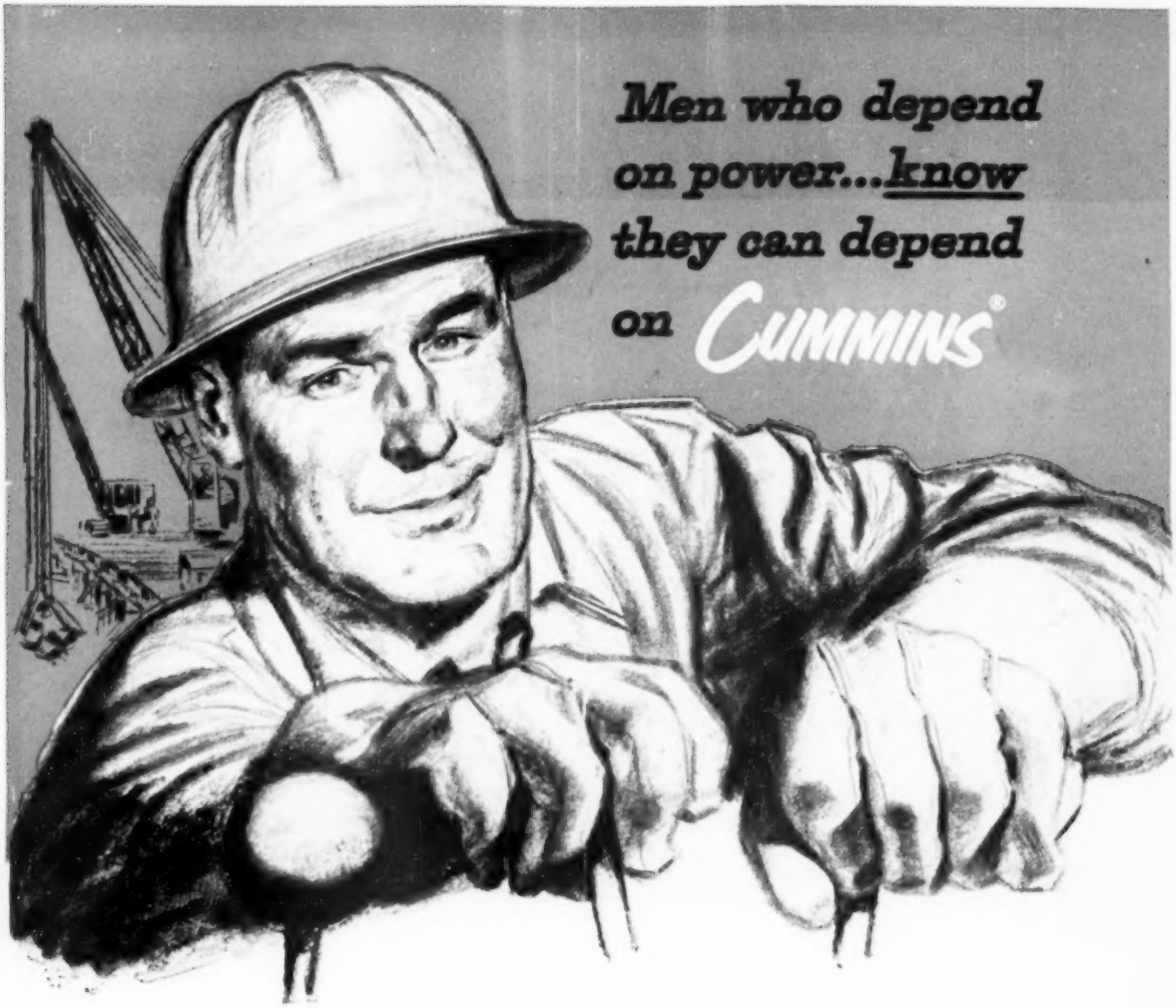


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